AVIATION WEEK

JAN. 24, 1955

A McGRAW-HILL PUBLICATION

50 CENTS



FOR VICTORY AT SEA

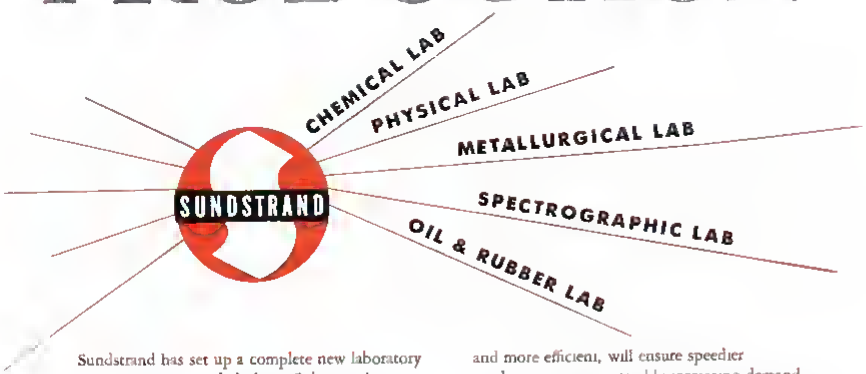
Should the need arise again, the Cougar II jet fighters above, plus the new Grumman Tiger, will play as big a role in victory as did Panther jets in Korea . . . as did Grumman Wildcats, Hellcats and Avengers of task force fame in World War II.

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CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Lockheed's New Navy Super Constellation

Latest giant plane to use B.F.Goodrich wheels and brakes

DESPITE 75 tons of take off load, the Navy's new R7V-2 Super Connie cruises at 440 mph. The problem was to set her down gently, stop all her weight and speed quickly. What solved the problem? The B.F.Goodrich wheel and brake designs that earned superior efficiency ratings on heavy bombers, largest airliners.

B.F.Goodrich brakes halt this Super Constellation fast because they operate on a highly efficient principle. Here's how simply this B.F.Goodrich principle works.

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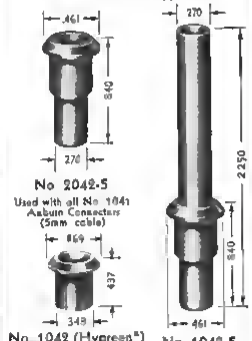
The B.F.Goodrich wheels on this Lockheed Super Constellation are made of magnesium alloy. This gives them extra strength without added weight. They easily passed the 200,000 lb. radial load test.

B.F.Goodrich De-Icers and fuel cells were also chosen as standard equipment for the R7V-2. Other B.F.Goodrich products for aviation: tires, heated rubber, Pressure Sealing Zippers, Avtrim, inflatable seals, Rivnuts, hose and accessories. Write *The B.F.Goodrich Company, Aeronautical Sales, Akron, Ohio*

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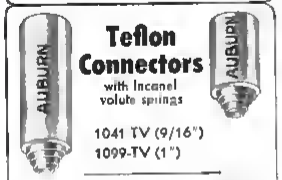


*Auburn Synthetic Rubber

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(Used with 3 48 Stud)

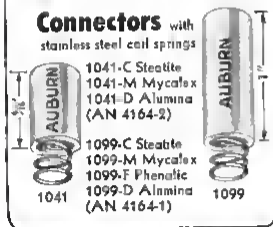


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1099-D Alumina
(AN 4164-1)

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Aviation Week

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Dow



Douglas DC-7 gains extra payload capacity from magnesium castings, extrusions and sheet

As the world's lightest structural metal, magnesium's growing place in military aircraft is now well established.

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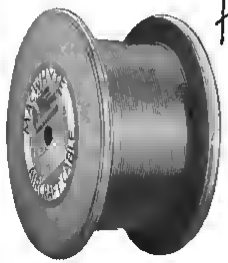
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Avro Tests CF-100 Jet Fighter Broking Chute

A Canadian Avro CF-100 Mk. 4 all-weather jet fighter slows its landing roll with the aid of a tail mounted parabrake being tested at Avro Aircraft, Ltd., Toronto. The parachute, stowed in the tail-cone, is popped just before the CF-100 touches down.

Domestic

New $16,383,790 order for Regulus surface-to-surface guided missiles has been placed by the Navy with Chance Vought Aircraft, Inc., Dallas. Previous production orders totaled approximately $40 million. The missile can be can be launched from submarines or surface ships.

John B. Macauley was sworn in last week as Deputy Assistant Secretary of Defense for Research and Development. Formerly director of engineering research and technical co-ordination of the Ethyl Corp., Macauley also has been chief of applied research for Pratt & Whitney Aircraft Division of United Aircraft Corp. and chief of Chrysler Corp.'s powerplant branch.

New turbojet powerplant, being designed by General Electric Co. for drones and pilotless aircraft under a USAF competitive development contract (AVIATION WEEK Dec. 20, 1954, p. 70), has been designated project MX2273.

Sen. Mike Monroney of Oklahoma has been appointed chairman of the aviation subcommittee of Senate Interstate and Foreign Commerce Committee. The subcommittee this session will consider omnibus civil aviation bills introduced by Sen. Warren Magnuson, chairman of the full committee, and Sen. John Bricker, ranking Republican member.

Tail turret systems for Douglas A3Ds will be built by Westinghouse Electric Co. under a new $18.7 million Navy contract. Production is scheduled to begin this summer.

"Wingless airplane" designer William E. Horton was sentenced to a 90-day jail term after pleading guilty to a criminal contempt action brought by the Securities Exchange Commission. He was charged with violating a temporary restraining order and preliminary injunction against selling unregistered securities in the Horton Aircraft Corp., Santa Monica, Calif.

Gen. John K. Cannon (USAF, Ret.), 62, board chairman of Fletcher Aviation Corp., postwar chief of the Tactical Air and Training Commands, and World War II commander of the Allied Air Force in the European-Mediterranean theatre, died Jan. 12 at Arcadia, Calif.

Frank B. Bolte, chief of Northrop Aircraft's engineering laboratories and member of the National Advisory Committee for Aeronautics, died Jan. 17 at Los Angeles.

Lightplane exports during 1954 totaled 496 aircraft with a combined value of $7,103,971, an increase of approximately 53% over 1953, reports Aircraft Industries Assn. Overseas shipments last month: 49 planes at $517,801.

Finonciol

Beech Aircraft Corp., Wichita, reports that 1955 commercial sales are expected to be 25% higher than 1954's $20 million-plus. During the first quarter of its new fiscal year (Oct.-Dec.), military and commercial sales totaled $18 million. Beech has voted a 30-cent dividend on common stock, payable Feb. 8 to holders of record Jan. 25.

Delta-C&S Air Lines has declared a 30-cent quarterly dividend, payable Mar. 7 to stockholders as of Feb. 18.

Marquardt Aircraft Co., Inc., Van Nuys, Calif., has asked stockholders to approve a stock increase from 200,000 to 300,000 shares to permit a two-for-one split through payment of a 100% dividend.

International

Turboprop Vickers Viscount crashed into a steel barrier while taking off from fog-enveloped Rome Jan. 16 when the pilot turned the British European Airways' transport onto the wrong runway, an old strip no longer in use. All but two of the 30 persons aboard escaped injury.

Pan American World Airways made its final flight out of New Delhi last week, ending seven years of U.S.-flag service to India's capital. The airline now will stop only at Calcutta under restrictions imposed by the Indian government when its bilateral agreement with the U.S. expired (AVIATION WEEK Jan. 17, p. 12).

Bristol Britannias are being considered by El Al Israel to replace four Lockheed Constellations now operated on longrange routes. Proposed order: $12 million.

West Germany's Lufthansa will be loaned nine British European Airways pilots for one year to fly the reborn airline's U.S.-manufactured transports. Until existing allied restrictions are lifted, German pilots will not be permitted to operate the aircraft over their home territory.

Canadian Army has purchased 16 Cessna L-19 Bird Dog liaison planes for about $270,000 to replace British-made Auster types previously used.

ANGLgear TRADE MARK

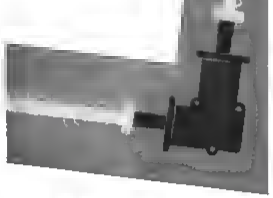
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The Aviation Week

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Vice President
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ROCKET ROOSTER HURLS piloted Republic F-84G Thunderjet aloft from zero launcher at Edwards AFB, Calif., during ARDC trials to develop techniques for operating conventional fighters without airfields (Aviation Week Jan. 18, 1954, p. 10, Dec. 13, p. 11) Bottle under the F-84G's tail drops off after the plane is airborne. Fighter would belly land on flexible mat, using arresting hook

New Developments Strengthen U.S. Airpower

MEETIHG AT SEA of Convair's turboprop-powered R3Y-1 seaplane and Electric Boat submarine USS Catfish, hints at tactical feasibility of extending the range of Navy's sub fleet by supplying undersea craft via air—or using sub fuel tankers as staging points to increase the "stretch" of its airfreighters or patrol planes. Both R3Y-1 and Catfish are products of divisions of General Dynamics Corp.



INDUSTRY OBSERVER

► Major part of helicopter research now under way at National Advisory Committee for Aeronautics' Langley, Va., facility is concerned with two rotor configurations. Tests have been completed on tandem design with no overlap and no stagger. Airflow measurements around single rotors still are being conducted as effort to lift bigger loads makes detailed data more vital to designers.

► **Rolls-Royce has confirmed an Aviation Week report (Nov. 8, 1954, p. 11) that it will supply Avon jet engines for the Ryan Aeronautical Co. vertical-takeoff fighter project for the Air Force. Engines will be built at Derby, England.**

► Finland is considering an initial purchase of six MiGs from Russia (AVIATION WEEK Jan. 17, p. 7). Finns now have six British de Havilland Vampires.

► **First of two prototype Leduc O.22s is to fly early this summer says French designer Rene Leduc. Designed for Mach 2 performance in a climb, the O.22 is the latest in a series of Leduc ramjets and features swept wings and the ability to take off from the ground instead of being air-launched. Takeoff powerplant will be a fuselage-mounted Snecma Atar turbojet. Fuel weight of the O.22 will be 30% of the plane's gross. From a standing start it is expected to climb to about 45,000 ft. in less than 3 min.**

► Important inertial navigation equipment development contract is hanging fire while Wright Air Development Center officials decide whether to put an additional $10 million into continuing North American Aviation's program or whether to accept an unsolicited proposal from Litton Industries to provide flyable models. Litton, which now employs several top experts in this field, has agreed to take the job on a fixed-price contract with a penalty clause.

► **French Sncase S.E. 210 Caravelle twin-jet transport prototype is 80% complete and is scheduled to fly this spring. Fuselage has been pressure-tested satisfactorily to 15% greater than normal expected pressure.**

► Production version of one Navy guided missile reportedly will be switched to use Project Tinkertoy type of avionic modules throughout, to eliminate possible production bottleneck in the event of war. Tinkertoy modules can be manufactured in a fully automatic production line (AVIATION WEEK Oct. 12, 1953, p. 72. See p. 50 for other Tinkertoy developments.)

► **Hydraulic boost to cyclic controls of the Bell 47H executive helicopter has been incorporated to give smooth precision feel to the cyclic stick. The hydraulic boost system utilizes about one quart of oil, gives about 100-lb. force to the fore-and-aft and lateral cyclic controls whenever directed by the pilot.**

► A French army missile, capable of being used by ground troops or by aircraft and copters, has been designed and tested by Sfecmas. It is designated the S.S.10.

► **First flight of the new French Boisavia B. 260 Anjou twin-engine light transport is scheduled soon. Powerplants for the aircraft are 170-hp. Snecma Regnier.**

► Bell Aircraft's XV-3 convertiplane is scheduled for rollout early next month at the manufacturer's Ft. Worth, Tex., plant. Aircraft is being developed for the Army.

► Split in Vortac committee recommendations on the civil DME versus military Tacan controversy has forced Air Navigation Development Board to put off long-awaited decision on the matter in order to investigate further "certain aspects of the problem." Final decision may not come for another 60 days.

WHO'S WHERE

In the Front Office

N. F. Vandenlipp has been appointed vice president of Hayes Aircraft Corp., Birmingham, Ala.

Carlos Du-Quesne, head of the Industrial Division of Cuba's Agricultural and Industrial Development Bank, has been named president of Compania Cubana de Aviacion replacing **Jose Lopez Vilaboy**. Martinez Ibor has replaced **Adolfo H. Suarez** as vice president-general manager.

Thomas P. Lombardo has been appointed a vice president of Dallas Avionics and will also handle sales and engineering activities for the company and its parent firm, Dallas Aero Service, Tex.

Richard W. Sylvester has been named assistant to vice president-sales and traffic of Pan American-Grace Airways. **Don B. Wilson** is appointed manager of agency and interline sales and **Donald A. Huff** has been designated cargo sales manager.

Changes

Dr. J. A. Kyger has been named director of nuclear engineering for Lycoming Division, Avco Manufacturing Corp.

C. F. C. Meuser has been promoted to Lockheed Aircraft Corp., director of sales for Europe, Africa and the Middle East and **Edward S. Fife** has been named the area's director of technical sales. Both men will headquarter in Geneva, Switzerland.

Ben S. Lee, former military aviation editor of AVIATION WEEK and Washington military editor of McGraw-Hill Publishing Co., has joined the Washington staff of Hill & Knowlton, Inc., to serve as publications director for Aircraft Industries Assn.

Robert M. Hawley has been appointed to the new post of military sales manager, Avro Aircraft Ltd., Malton, Ont.

Honors and Elections

John P. Gaty, Beech Aircraft Corp. vice-president-general manager, has been elected chairman of the Aircraft Industry Assn.'s Utility Airplane Council and to AIA's board of governors succeeding **William T. Piper**, president of Piper Aircraft Corp., on these positions.

Ed Sinclair Smith, staff technical assistant with the Weapon Systems Analysis Branch, Ballistic Research Laboratories, Aberdeen Proving Ground, has received the 1954 award of the Instruments and Regulators Division of the American Society of Mechanical Engineers.

Carl G. A. Rosen, consulting engineer to the president of the Caterpillar Tractor Co., has been installed 1955 president of the Society of Automotive Engineers, succeeding **William Littlewood**, American Airlines vice president-equipment development. Among new SAE vice presidents are transport, **R. Dixon Speas**, consultant, aircraft, **James D. Redding**, Aviation Gas Turbine Division, Westinghouse Electric Corp., aircraft powerplant, **F. E. Carroll, Jr.**, United Aircraft Products, Inc., engineering materials, **W. Paul Eddy, Jr.**, Pratt & Whitney Aircraft Division.



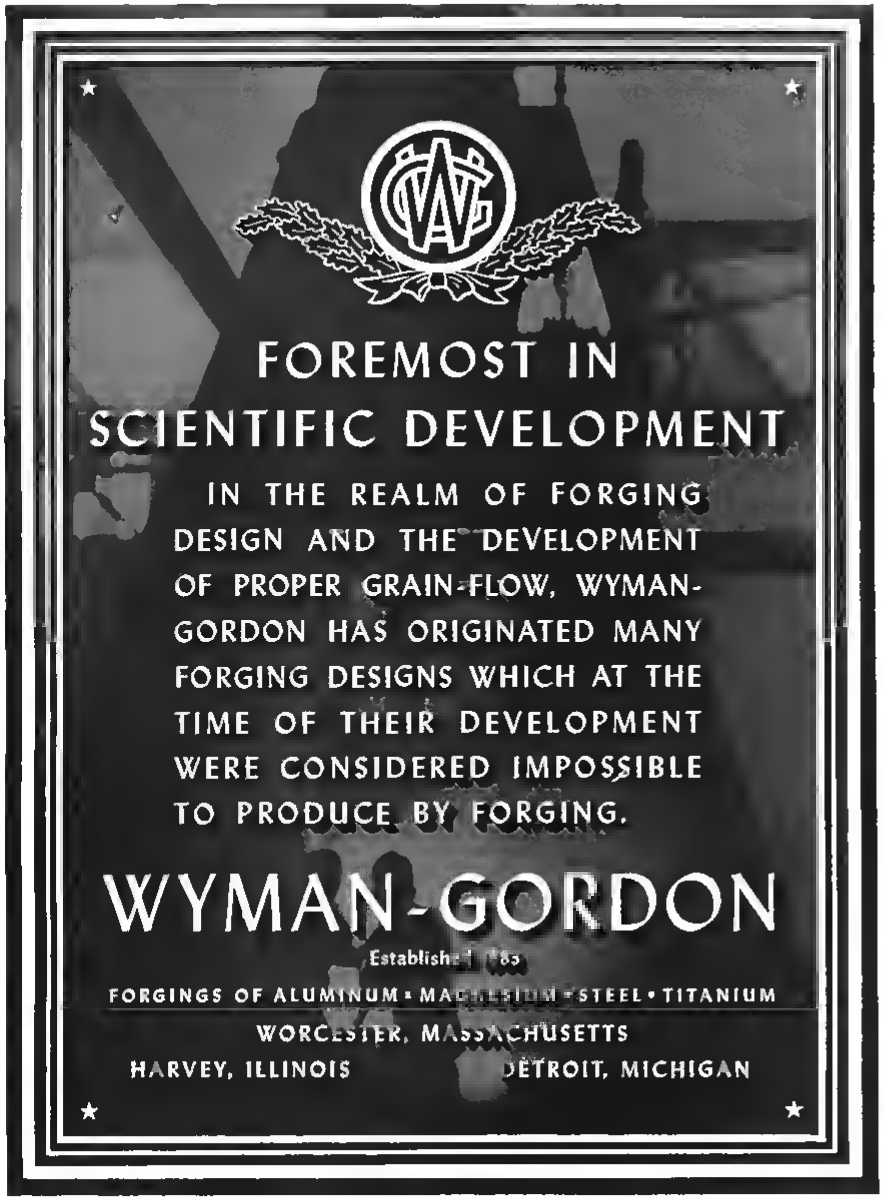
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AVIATION WEEK
VOL 62, NO 4
JANUARY 24, 1955

U.S. Will Spend $8.3 Billion for Aircraft

- **New buying funds asked for 1956 top $7 billion.**
- **Appropriations request sets peacetime record.**

By Claude Witze

Military aircraft procurement expenditures in fiscal 1956 will be $8.3 billion, the same high level as in fiscal 1955, according to the federal budget presented to Congress last week by President Eisenhower.

Future payments to the industry are buttressed by a fiscal 1956 aircraft appropriation request of more than $7 billion, largest in peacetime history. This is an increase of more than $2.25 billion over fiscal 1955.

►**$7.5 Billion in Contracts**—The military services plan to let new contracts for aircraft and guided missiles amounting to about $7.5 billion in fiscal 1956. Funds will come from the new appropriations request and previously appropriated funds. Estimated figure for fiscal 1955 is less than $7 billion.

In addition to the new money requested, Defense Department had on hand at the end of last November unobligated aircraft procurement funds of $8.65 billion. Of this, $6.33 billion is for USAF and $2.32 billion for the Navy. Defense Department estimates that by the end of fiscal 1955, next June 30, USAF's unobligated balance will be down to $3 billion.

"About two-thirds of the projected Department of Defense expenditures in the fiscal year 1956 will be devoted to airpower and related programs—both offensive and defensive," the President told Congress.

►**40,000 Planes**—The military services will increase their strength to about 40,000 planes.

■ **U. S. Air Force**, with a goal of 137 wings, will have 130 of them by June 30, 1956. Of these, 119 will be combat wings.

■ **U. S. Navy and Marines** will maintain 10,000 operating aircraft. The number of carrier air groups will increase from 16 to 17. An additional attack carrier will be added to the fleet. The Marines will maintain three combat-ready divisions and three air wings.

■ **U. S. Army** will maintain 3,600 active aircraft. In the next two years, the number of Army helicopters will increase by more than 20%.

►**Power Increase**—"The growth in our effective airpower," the President said, "is far greater than these numbers indicate, for our aircraft continue to increase in size, speed, range and striking power.

"By the end of the fiscal year 1956, the total number of aircraft in combat units of the Air Force, Navy and Marine Corps will be approximately

Key Military Aviation Programs For Fiscal 1956

Here are details on the program of U. S. military services for ordering aircraft, missiles, electronics and related equipment for fiscal 1956. Included are funds for overhead expenses, such as salaries and rentals. Comparison with previous fiscal years is shown.

Funds the services will have for placing new orders include money requested for fiscal 1956 and residue of funds appropriated for previous years. Because of the substantial lead time involved in aircraft procurement, the bulk of expenditures for these orders will be reflected in payments to the industry in future fiscal years.

	FY 1954 (actual)	FY 1955 (estimate)	FY 1956 (estimate)
		(in millions)	
AIR FORCE			
Procurement programs			
Aircraft procurement	$3,326.0	$4,520.0	$5,050.0
Guided missiles	338.6	476.7	603.0
Industrial mobilization	10.4	109.0	22.1
Electronics and communication equipment	325.0	419.0	594.0
Training equipment	46.6	81.1	48.1
Research and development programs			
Aircraft	126.0	135.0	155.0
Guided missiles	93.5	119.0	105.0
Rockets and other ammunition	24.0	18.2	16.8
Military sciences	49.0	62.2	62.2
NAVY			
Procurement programs			
Aircraft	$678.0	$1,525.0	$1,567.0
BuAer guided missiles	61.0	108.5	118.5
BuOrd guided missiles	65.8	62.7	76.0
Marine Corps guided missiles and ammunition	39.5	170.0	220.0
Aerial communication, navigation and detection equipment	15.5	24.9	32.6
Marine Corps electronics and communication equipment	19.2	54.0	10.0
Ship communication, navigation and detection equipment	5.6	43.0	74.5
Aviation training equipment	14.4	39.5	18.9
Aircraft modernization	3.9	42.6	39.0
Research and development			
Aviation	185.0	170.0	165.0
ARMY			
Procurement programs			
Guided missiles and ammunition	$860.0	$941.8	$578.0
Research and development			
Air defense	33.3	32.8	32.5

Airpower Funds

This is the overall request by Air Force, Navy and Army for funds for aircraft and related procurement. Planned expenditures also are shown. The expenditure rate—funds paid to the aircraft industry—for fiscal 1956 is about the same as in fiscal 1955

	New Money FY 1955	New Money FY 1956	Expenditures FY 1955	Expenditures FY 1956
	(in billions)			
Air Force	$2.76	$6.1	$6.4	$6.15
Navy	1.97	.75	1.9	2.0
Army		.15	.069	.118

*Request in fiscal 1956 does not include money for guided missiles, included in the 1955 estimate

Civil Aeronautics Administration

	New Money FY 1955	New Money FY 1956	Expenditures FY 1955	Expenditures FY 1956
Administration (federal airways, aviation safety, airport administration)	$98,080,000	$106,150,000	$98,863,000	$105,275,000
Establishment of air navigation facilities	5,000,000	30,000,000*	11,015,000	15,000,000*
Federal airport aid	22,000,000	18,500,000†	15,851,000‡	19,500,000†
Air navigation development	1,050,000	2,000,000	938,000	1,570,000
Alaska airports				
Operation	600,000	750,000	577,000	715,000
Construction			140,000	
Washington National Airport				
Operation	1,350,000	1,415,000	1,356,000	1,400,000
Construction	340,000	525,000	628,000	525,000
Technical development and evaluation	700,000		739,000	50,000
Federal airport claims	69,400		316,000	215,000
Land purchase for new Washington Airport	16,300		15,200	
Total	129,205,700	159,340,000	130,439,200	144,250,000

* Of which $7 million is for the liquidation of contracts previously let
† Of which $7.5 million is for contract liquidation
‡ Of which $5.4 million plus is for contract liquidation.

Civil Aeronautics Board

	New Money FY 1955	New Money FY 1956	Expenditures FY 1955	Expenditures FY 1956
Administration	$ 3,777,000	$ 4,125,000	$ 3,763,000	$ 4,098,000
Payments to airlines	58,500,000*	63,000,000	70,464,000*	63,000,000
	62,277,000*	67,125,000	74,227,000*	67,098,000

* Includes $18.5 million to be requested in a supplemental bill

one-fourth greater than at the beginning of the current fiscal year

"The number of jet aircraft in such units will increase by more than one third during the same period

"The increasing modernization of our airpower is shown by the fact that by June 30, 1956, the Air Force combat units will be almost 100% jet equipped The proportion of jets in the combat units of the Marines and Navy will increase by approximately 15% over the beginning of the current fiscal year"

▶ **$34-Billion Budget**—Total budget for the Department of Defense is about $34 billion USAF gets the major share —$15.6 billion, compared with $15.2 billion in fiscal 1955 The Army's appropriation request is $8.85 billion, a slight reduction The Navy request is $9.7 billion, a reduction from fiscal 1955. It contains authorization for a fifth carrier of the Forrestal class

Other budget highlights

- Defense Department says an important impact on the aviation industry will result from a change in the product mix There will be more interceptors, fewer fighter-bombers There will be more heavy transports and bombers, fewer light transports and bombers
- Electronics equipment expenditures will remain about the same as in fiscal 1955, as defined in that category by the Defense Department However, they are increasing rapidly when considered as part of the production of weapon systems carried in the budget under aircraft procurement
- Request for funds for guided missiles was held back by technological developments, not coming as fast as the armed services would like to have them
- USAF's active aircraft inventory will grow from 22,400 to 22,900 during the year Of the 130 wings at year's end up from 121 on June 30, 1955, 11 will be troop carrier wings During the new fiscal year two troop carrier wings will be shifted from USAF to the Air National Guard
- Total military aircraft acceptances for the year will run about 6,000 The figure for fiscal 1955 is about 7,000 But the value of the years purchases will remain about the same, largely because weapon systems are growing more complex and expensive

Civil Air Budget

The Administration's fiscal 1956 budget for civil aviation calls for an increase over fiscal 1955 of $18 million in funds for air navigation equipment and a $7 million decline in airline subsidy payments

President Eisenhower's overall request for the promotion of civil aviation in fiscal 1956 is $284 million This represents funds for the activities of numerous federal agencies directly or indirectly involved in civil aviation It is an increase of $10 million over fiscal 1955

The President said shifts in federal aviation programs during the last two years have been made "to reduce assistance no longer required and to concentrate on those federal aids which are indispensable to the continued rapid progress of aviation"

▶ **Subsidy Lower**—A reversal of the trend to higher airline subsidies is a major feature of the new budget

Last year, Civil Aeronautics Board figured it would need $80 million for subsidy in fiscal 1955 Congress balked and appropriated only $40 million Now CAB finds it can meet its requirements for fiscal 1955 with an additional $18.5 million and about $12 million in carryover funds—a total of approximately $70 million

The estimate of $63 million for the coming year continues the downward trend

The big reduction comes in estimates for international subsidy, dropping from $27,587,000 to $21,574,000 Two big factors in this drop are the trans-Atlantic mail trade decision that reduced original subsidy estimates considerably and virtually took Trans World Airlines off subsidy, and the decision of the Department of Defense to ship military mail by commercial airlines.

It is estimated that this military mail business will bring more than $18 million to the carriers annually and, despite a reduced service rate will bring Atlantic and Pacific airlines much closer to the point of subsidy-free operations

Subsidy for domestic trunklines drops from $5,447,000 to $4,557,000 in the 1956 budget Helicopter subsidy drops from $3,365,000 to $2,909,000 Amounts for local service airlines ($24,950,000) and Alaskan and Hawaiian operations ($9,010,000) are unchanged

▶ **Congestion Factor**—Eisenhower, describing Civil Aeronautics Administration activities, said: "The continuing growth of civil and military air traffic has increased congestion on the airways system—at times restricting aircraft operations in areas of heavy traffic

"As a step to maintain high standards of safety and increase the regularity of flights, I am recommending increased appropriations for the Civil Aeronautics Administration for expansion and improvement of air navigation facilities and for more radar traffic control equipment."

▶ **Navigation Expansion**—The big increase in the CAA budget is a jump in the appropriation request for establishment of air navigation facilities, climbing from $5 million in fiscal 1955 to $23 million for fiscal 1956 The additional money will go for such projects as expansion of radar programs and communication systems and implementation of VOR and DME programs

The federal aid airport program takes a 50% cut in the new budget The fiscal 1956 request is for $11 million, compared with a $22 million appropriation for fiscal 1955

The CAA share of the air navigation development program carried on by the Air Navigation Development Board, is $2 million—about double last year.

The Administration is reviving its effort to incorporate Washington National Airport "to provide the administrative flexibility needed for efficient operation of this business-type enterprise." This idea met with little success in Congress last year

NACA Research Funds

Burgeoning problems of supersonic flight research, both aerodynamic and propulsion, are reflected in the fiscal 1956 appropriation request by National Advisory Committee for Aeronautics.

NACA is seeking $76.5 million for fiscal 1956 an increase of $20 million over fiscal 1955

▶ **Construction Increase**—Major portion of the increase is for construction at three laboratories and one station operated by NACA Total construction request is $13 million, compared with $4.6 million in fiscal 1955. NACA plans to let contracts during the new year for only $8.5 million of the $13 million

The proposed fund would cover:

- Alterations to an existing windtunnel at Langley Aeronautical Laboratory (Va.) for highspeed aerodynamic research
- Two new facilities at Ames Aeronautical Laboratory, Moffett Field, Calif., for research on aerodynamic heating
- Construction of a research facility at Lewis Flight Propulsion Laboratory, Cleveland, Ohio, for nuclear propulsion, alteration of an existing windtunnel to increase its speed range and additions to an existing fuel laboratory and utility improvements.
- Utility improvements at the Pilotless Aircraft Station, Wallops Island, Va.

Included in the request is $1,880,000 to cover obligation in prior years for alteration of the 19-ft. pressure tunnel and construction of a high-temperature structural research laboratory at Langley.

Construction funds to be obligated: Langley Laboratory, $3,973,802, Ames Laboratory, $720,108 Lewis Laboratory, $3,716,000, Wallops Island $90,000 By purpose of facilities this is broken down into $2.9 million for aerodynamic research, $3,720,000 for powerplants and $1,880,000 for aircraft structural and operating problems

NACA will obligate about $734,000 in fiscal 1956 from an appropriation of $75 million made in 1950 for the unitary windtunnel plan These tunnels (Langley, Ames and Lewis) are being placed in operation during fiscal 1955.

▶ **Research Boost**—By activities, NACA for fiscal 1956 is requesting

- Aerodynamic research, $33.6 million, an increase of $6.7 million over fiscal 1955
- Powerplant research $18,025,000, an increase of $2,626,000
- Aircraft structural research $8,640,000, an increase of $2,224,000
- Operating problems research, $1,830,000, an increase of $27,000

Balance of the NACA request is $1,405,000 for headquarters management and coordination

Gobbledegook

Defense Department budget experts have made a new and major contribution to Washington gobbledegook.

- **The phrase: Unallocated reduction in estimates.**
- **The definition: Unidentified slippage.**
- **The arithmetic (in fiscal 1956 budget): Minus $1.75 billion.**

Nub of the matter is that each year Defense asks for a certain amount of money that it never spends. Strikes, material shortages, failure to make a technological advance, changes in requirements can cause this situation. "In some part of almost every program," said one official, "something won't happen."

Each service must ask for all the money it expects to need, yet at the top level it is known that not all of it will be spent. The $1.75-billion figure was knocked off the estimated 1956 budget to allow for these situations. Result: Defense budget of $34 billion is an educated guess of what Defense will spend on a program that individual services would value at $35.75 billion.

USAF Tries to Speed Simulator Programs

Air Force is seeking closer cooperation between the aircraft industry and simulator manufacturers to eliminate delays and confusion in transmission of data from airframe builders

Representatives from simulator and aircraft companies met with Air Force and Navy officials in the Pentagon last week to thrash out the problem of phasing in construction of simulators with the weapon system they support

"Timely procurement, development, production and modification of special training devices can only be accomplished if the prime aircraft manufacturer, simulator manufacturer and the Air Force work closely together in the administration of the program," USAF said

Conference goals

- To resolve procedures for timely transmittal of data regarding aircraft changes that affect flight simulators
- To set up criteria for use in determining what aircraft changes necessitate simulator changes
- To resolve management procedures necessary to approve and direct simulator modifications in production and in-service
- To determine guidance necessary for the airframe manufacturer to prepare data for the simulator
- To review target dates for completion of specifications transmittal of data etc., in order to effect timely production of a simulator
- To discuss requirements for purchased parts and subassemblies and methods of timely programming for them
- To discuss methods of accomplishing state of the art development for simulators separate from production contracts and in time to support new requirements
- To give the airframe and simulator industries the opportunity to recommend ways of improving the flight simulator program

Collision Indicates:

Crowded Areas Need IFR Control

Mid-air crash of 2-0-2A and DC-3 backs up arguments for 24-hour instrument rules at high-density airports.

By Craig Lewis

The problems of air traffic control were brought into sharp focus early this month by the collision of a Trans World Airlines Martin 2-0-2A and private DC-3 near Cincinnati, Ohio. Fifteen persons were killed. (AVIATION WEEK Jan. 17, p. 7)

Preliminary investigation shows the TWA transport had filed an instrument flight plan and was flying without knowledge that there was another plane in the area. The DC-3 had filed no flight plan and failed or was unable to contact local controllers.

▶ **Factors**—The accident points up two factors in the airspace and air control problem:

• **Visual flight rules.** Although this was the first collision of large aircraft in bad weather, the DC-3 was flying under VFR. Very nearly all collisions recorded have occurred in clear weather and broad daylight—ideal visual flight rule conditions.

• **Human error.** Apparently the DC-3 pilot figured he could get along in the marginal weather and took a chance.

This combination—human error and VFR in marginal weather, emphasizes part of the growing problem of diminishing airspace and the measures needed to realize the only solution: More efficient use of the airspace.

The fact that most collisions have occurred in VFR conditions illustrates a good part of the problem. As more and better airplanes are built, the situation gets more complex. In some cases, aircraft design limits pilot visibility. Yet speeds are increasing tremendously, and the margin of safe operation under VFR is shrinking correspondingly.

▶ **Speed Complication**—Some observers believe that in high-density areas, the "see and be seen" philosophy under which a pilot flying VFR is supposed to take care of himself, is becoming a fiction. As speeds increase, the time left to take action shrinks, approaching a point where little can be done even if another aircraft is observed in a threatening position.

Although this factor still is developing, it is taken into very serious account in considerations of future plans being made by government and industry groups.

Traffic control is complicated at airports and in the airways by VFR procedures, especially in marginal weather. When a situation exists where both IFR and VFR are being used, the effectiveness of IFR is reduced because the traffic controllers have complete control of only IFR traffic. Aircraft on VFR are an unknown factor unless and until they identify themselves.

▶ **Around-Clock IFR**—One solution being discussed by experts is the possibility of operating high-density areas under 24-hr. instrument regulation. Thus, all operations in a specified area always would be on instruments, in good and bad weather.

This system has the advantage of the superior safety that the record proves exists in instrument-controlled operations. It would not have to compute human factors and lack of discipline, a built-in facet of VFR operation. As practices and equipment grow more efficient, controllers could make more efficient and precise use of the limited airspace available to them.

But, assuming Civil Aeronautics Administration had the equipment and personnel available for such an operation and decided to try it, there is no assurance it would be adopted. The airlines are wary of a system that could slow operations.

There are the questions of individual rights involved. Can you legally require that any pilot who wants to fly into a high-density area must have special equipment and an instrument rating?

▶ **Washington Experiment**—One attempt to alleviate the problem is in the works for Washington National Airport. A one-year test plan has been set up to control VFR traffic in the area.

Under the plan, a Washington high-density air traffic zone is established in the immediate airspace around the airport and up to 3,000 ft. The aircraft operating in the zone under VFR conditions must establish and maintain radio contact with the tower and observe a speed limit of 180 mph. En route aircraft could fly around the zone or over the 3,000-ft. limit.

Some opposition to the project has come up, and public hearings will be held. Chances are that it will get under way without too much difficulty.

▶ **Traffic Growth**—A substantial contribution to the problem is possible through development and use of improved navigational aids. CAA, continually fighting budget problems, has a number of programs under way and planned for improving its control facilities.

The agency has, over the years, attempted to make use of proved communication, navigation and control equipment. Through increased efficiency, CAA has managed to maintain its high standards while traffic has grown out of proportion to the increase in its funds.

Right now, there are a number of programs in various stages of implementation. Instrument landing systems, distance measuring equipment, VHF omniranges, precision approach, airport surveillance and secondary radars and other common system items are constructed, under construction or programmed in future budgets.

▶ **Future Plans**—In addition to facilities now being considered, CAA, the Air Coordinating Committee and various industry groups are looking forward to improvements in the system. Some are considered evolutionary, others, such as longrange radar, are considered absolute musts in certain areas such as New York and Chicago.

Longrange radar will give greater control over traffic beyond the scope of local airport radar and improved control of en-route traffic, thus allowing more efficient use of the airways. It is difficult at the present time to control traffic coming into high-density areas before it reaches the limited 20-40 mi. range of airport radar. Better control beyond that range is needed to prevent jams before they occur by controlling the influx.

Associated with this is the need for a system of pictorial presentation of traffic at control centers to replace the present cumbersome manual strip posting system. The project involves development of a radar map outlining the areas upon which aircraft can be plotted as they move through the airways system. This will provide a precise, comprehensive picture of the existing traffic pattern. (AVIATION WEEK Dec. 27, 1954, p. 21).

▶ **Direct Communication**—Correlated with the use of longrange radar is the problem of longrange communication between pilot and tower. Currently, controllers must talk to pilots through a third person relay. New systems will allow direct communications between the two, eliminating the time lag in information and instruction that now exists.

Radar beacons are another installation that would improve radar operating efficiency. Installed on aircraft, they would sharpen detection and afford an easy means of identifying planes that appear on radar scopes.

Anti-collision lights, now prescribed by Civil Aeronautics Board for installation by June 1, 1956, have contributed to improving the collision situation but not to the needed degree—since it apparently is a daytime problem.



Latest View of Longrange Douglas DC-7B

Flight view of the new Douglas DC-7B shows the transport's new propeller spinners and saddle-type fuel tanks that form part of the enlarged engine nacelles. New tanks increase normal DC-7 fuel capacity from 5,512 gal. to 6,400 gal. Pan American World Airways is getting the first of seven DC-7Bs in April. Eastern Air Lines has 12 on order and South African Airways three.

Committee May Get New Status in Senate

Legislation to give standing status to the Senate Small Business Committee has the support of 52 senators. The committee has supported the position of nonscheduled airlines and opposed many Defense Department procurement policies.

Under the new status, the committee would have authority to pass on legislation. As a special committee, its activities now are limited to reviewing and recommending.

A move also is under way to give the House Small Business Committee standing status. The bills were introduced by Sen. Edward Thye and Rep. William Hill, outgoing Republican chairmen of the two committees.

Other bills affecting aviation introduced in the opening days of the new Congress would:

• Exempt operations in the transportation of livestock, fish, agricultural, floricultural and horticultural commodities from CAB regulation, by Rep. J. A. Younger of California.

• Permit the granting of free or reduced-rate transportation to ministers of religion, by Rep. Victor Wickersham of Oklahoma and Rep. Samuel McConnell of Pennsylvania.

• Punish the malicious destruction of aircraft and attempts to destroy aircraft, by Rep. Kenneth Keating of New York.

• Provide for the training of civilian aviation personnel by Rep. Carl Hinshaw.

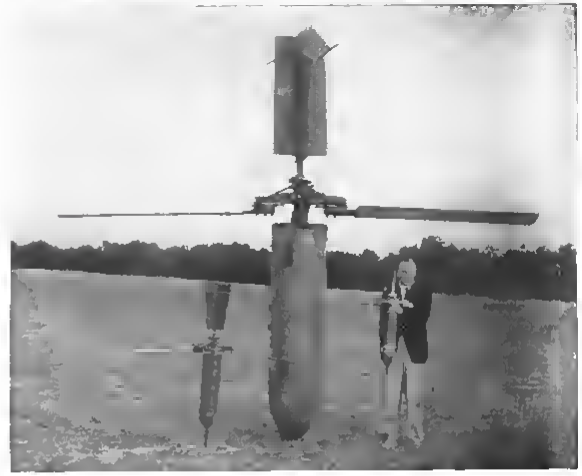
• Authorize the construction, operation and maintenance of heliports on or near government buildings, by Rep. Hinshaw.

• Require the preparation of passenger lists for all flights of commercial airlines, by Rep. Thomas Lane of Massachusetts.

• Establish an "inventions awards board" in the Department of Defense, by Rep. Emanuel Celler of New York.

• Establish a select committee to investigate subsidies paid by the federal government, by Rep. H. R. Gross of Iowa.

• Provide for a special postage stamp in honor of the late Amelia Earhart, by Sen. Estes Kefauver and co-sponsored by 29 other senators.



Kaman Develops Ratochute for Corgo Drops

Kaman Aircraft Corp., Bloomfield, Conn., has developed a rotor-device it calls the Rotochute to permit aircraft to drop equipment and supplies from lower altitudes at higher speeds and with greater accuracy than with a parachute. In center of photo is a standard military M-2 airdrop container fitted with a full-scale Rotochute, at left is a one-third scale model, and at right a one-sixth scale model. In use, the Rotochute's blades are folded back 90 deg. and telescoped for ease of attachment to a plane's bomb rack. When released, the blades swing outwards and rotate, centrifugal force opening them full length. Kaman developed this device under a Navy contract.

Catastrophe?

Turbine Builders Hit Standardization Plan

Major and fundamental controversy between Department of Defense and U S aircraft turbine manufacturers is developing over a proposed defense procurement policy aimed at more standardization in the engine field

Frank D Newbury, Assistant Secretary of Defense for Applications Engineering, told AVIATION WEEK the policy statement draft now being circulated among engine makers is No 4 in a series that will be continued until one is adopted by the Defense Department

▶**Industry Reaction**—Immediate industry reaction was that the proposal would be "catastrophic." This attitude is based on a "lack of understanding," Newbury countered. The assistant secretary said the policy has been requested by one branch of the armed forces, presumably USAF

Purpose of the policy, according to Newbury, is to cut down on the types of jet engines and cost of their development

In order to do this, the policy draft now being circulated would

- Set up a standard system of thrust ratings, 6,700, 10,000, 15,000 and 22,500 lb
- Set up a standard system of preferred diameters ranging from 25 to 45 in
- Provide for final development and evaluation of only one engine out of the designs offered in any competition

Aircraft Industries Assn acknowledged writing a letter of protest to Defense Secretary Charles E Wilson, but refused to comment on the situation

Individual engine makers said they felt strongly that the old laissez-faire competitive system is best and cited the record made by the industry in the past 15 years with both jet and reciprocating engines

The proposed directive, they fear, would have these bad results

- Eliminate flexibility in use of engines
- Stifle competition
- Increase costs
- Delay deliveries
- Force plane designers to rely on one engine, without an alternate that could be installed if "bugs" develop

First three drafts of the proposed policy were circulated only to the military services. The armed forces themselves apparently are not fully agreed on the policy as it stands in the first version submitted to industry for comment

In its letter to Wilson, AIA demanded that the secretary meet with an industry committee to discuss the problem

Sen. Thye Challenges Mobilization Directive

Explanation by Assistant Defense Secretary F P. Pike of the department's mobilization base directive (AVIATION WEEK Dec 27, p 15) has failed to satisfy Sen Edward Thye, outgoing chairman of the Senate Small Business Committee

Pike's explanation was sent to the senator in reply to a telegram addressed to Defense Secretary Charles E. Wilson. Thye challenged the Defense Department's contention that the directive, aimed at broadening the mobilization base, would benefit small business

In a letter to Pike, Thye raises these five issues

- The directive refers to a list of "suppliers," and not of "items," despite Pike's contention to the contrary. Thye points to this wording of the directive: "Data assembled on essential mobilization suppliers . . . shall be used in planning current procurement."
- If firms "already deemed essential suppliers" are to receive procurement under the directive, how can small firms "establish" themselves for procurement, Thye asks. "This could result in the endless chain in which the small businessman could not find an open link," he says
- Even if security classification prevented clearance of the directive with the Small Business Administration, the SBA could have and should have been consulted on "the broad impact" of the directive, Thye says
- Pike's observation that the directive refers "only" to items on the preferential planning list, and does not even refer to "components" of items on the list, Thye considers misleading. He says items on the list account for 70 to 75% of defense expenditures. He charges that the weapons system concept, under which prime contractors assume responsibility for delivery of a complete item, dims the prospect of small firms participating in component contracts
- Disputing Pike's contention that "negotiation of military procurement in no way implies an absence of price competition," Thye points out that the General Accounting Office takes the contrary position that "the advertised procurement method . . . guarantees the best price"

Copter Leaders Urge Commercial Subsidy

Subsidization to promote wider commercial use of helicopters as a necessary part of the civil defense effort was urged at the 7th annual convention of the Helicopter Association of America, held in Philadelphia

J. P. W. Vest, assistant to general manager, Sikorsky Division, United Aircraft Corp., and Col William B Bunker, commandant of the Army's Transportation School at Ft Eustis, Va., joined in endorsing the idea

▶**Support Pioneers**—Vest said that a grass-roots effort is needed to sell the proposal to Congress. The legislators could act by telling Civil Aeronautics Board to support pioneer helicopter operators as an aid to civilian defense just as they now subsidize airlines as a necessary part of the postal and transportation system

Col Bunker said the Army never will be able to provide more than the helicopters and some spare parts. The Army's return from this program would be in the accelerated service testing of machines by scheduled operators

▶**New Officers**—Other speakers at the three-day Philadelphia meeting discussed their helicopter operations. Representatives of aircraft and engine manufacturers reported on their development programs. The members spent one day visiting the Morton, Pa., plant of Piasecki Helicopter Corp

Elected president of HAA was Elynor Rudwick, president of Kern Copters, Inc., Bakersfield, Calif. Leon Plympton, New England Helicopter Service, Hillsgrove, R. I., was named treasurer, and Harry Armstrong, San Fernando, Calif., secretary.



Rayal Navy ta Get DH-110 Fighters

British Ministry of Supply has ordered a quantity of de Havilland 110 two place all weather fighters for the Royal Navy. Here a DH 110 prototype lands aboard HMS Albion during carrier trials. Production DH-110s will be powered by two late-model Rolls-Royce Avons and have folding wings plus equipment necessary for carrier operation. First production models will be produced at DH's Christchurch plant; another assembly line may be started later at Chester. In addition to 30 mm Aden cannon, the DH-110 is designed to carry air-to-air guided missiles and considerable avionics equipment.

Cause of Verdin Death Crash Still a Mystery

Los Angeles—Cause of the A4D crash that took the life of test pilot James B Verdin, 37, remained a mystery last week as Douglas Aircraft Co. continued its investigation of the wreckage

Verdin, former Navy combat pilot and holder of the world's 3 km speed record, used the lightweight atom bomber's ejection seat at 35,000 ft after radioing Edwards Air Force Base that he was going to bail out. He gave no reason.

▶**Unopened Chute**—His body was found near the crashed Skyhawk, with the parachute unopened. Apparently Verdin made no attempt to open the manually operated chute, although he had broken free of the ejection seat

Edwards medical officers said Verdin apparently was unconscious when he struck the ground and was killed by the impact. One possibility being investigated by Douglas was that explosive decompression left the pilot unconscious

▶**Low-G Turns**—The company said the plane was the fourth Skyhawk built and that it was on its 22nd flight. Verdin was making buffet boundary tests at altitude at the time of the mishap

Company engineers said the tests called for low G turns at altitude

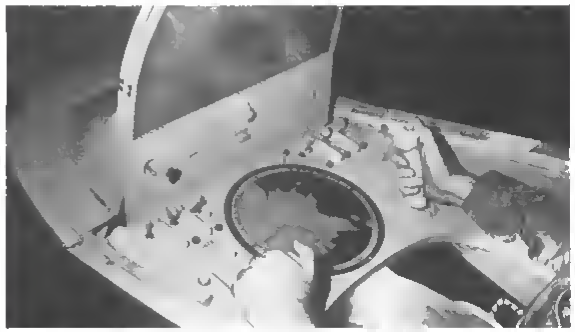
USAF Orders Engine Checks on 92 C-119s

Ninety two USAF Fairchild C-119 transports underwent an extra engine check last week, ordered after a series of four accidents during an airlift of 3,000 paratroopers to "Exercise Snowbird" in Alaska. Two men were killed and 99 paratroopers forced to bail out

Douglas Studies Radical New Cockpit . . .



FUTURISTIC FIGHTER COCKPIT, shown in mock up designed by Douglas Aircraft Co under Navy sponsorship, utilizes new flat TV type picture tubes to display information normally shown on a multitude of cockpit instruments (Aviation Week Jan 17, p. 17).



HORIZONTAL AND VERTICAL PICTURE TUBES will give pilot information on airplane altitude, airspeed, attitude and ground position. Navy hopes to reduce number of controls to two: throttle (l) and stick (r). New cockpit is expected to cut training time by 75%.



TRANSPARENT PHOSPHOR SCREEN used in new flat tube, developed by Electronic Division of Willys Motors, Inc., will enable pilot to look through vertical display when he wants to fly contact. Tube, only three inches thick, uses electron gear and beam

C. R. Smith Acquires 44,000 AA Shares

C R Smith, president of American Airlines, has exercised an option for the acquisition of 44,000 common shares of AA stock, Securities and Exchange Commission reports

Other transactions include

Air Associates, Inc Disposal of 400 common shares by Hal A. Kroeger director, leaving a holding of 250

Allegheny Airlines Disposal of 2,700 common shares by Robert M Love director, leaving a holding of 20 000

American Airlines Acquisition of 5,000 common shares by G J Brandewiede officer, through exercise of option making a total holding of 8 000; acquisition of 1 000 common shares through exercise of option by W Nelson Pump officer making a total holding of 1 100; acquisition of 5,000 common shares through exercise of option by L G Fritz officer making a total holding of 5,200; acquisition of 9 000 common shares through exercise of option by G K Griffin officer making a total holding of 9,500; acquisition of 4 000 common shares through exercise of option by William J Hogan officer, making a total holding of 5 000; acquisition of 4,000 common shares through exercise of option by C W Jacob, officer making a total holding of 8,000; acquisition of 1 050 common shares through exercise of option by Stanley G King officer making a total holding of 1,250; acquisition of 2 000 common shares through exercise of option by F G Lasle officer making a total holding of 8 000; disposal of 3 000 common shares by William Littlewood officer, leaving a total holding of 2,000

Bell Aircraft. Acquisition of 200 common shares by Julius J Demeschos officer making a total holding of 1,200; acquisition of 600 common shares through stock dividend, by Harvey Gaylord officer, and disposal of 400 common shares making a total holding of 800; disposal of 300 common shares by Page Hufty, director, leaving a total direct holding of 100 and an indirect holding of 782,433; acquisition of 800 common shares through stock split by R. J Sandstrom officer and disposal of 1 200 common shares leaving no holding; disposal of 1 600 common shares by Ray F Whitman, officer and director, leaving a total holding of 10,400

Beodix Aviation Acquisition of 428 common shares by Charles Hummel officer making a total holding of 830; acquisition of 920 common shares by George E Stall, officer and director making a total holding of 1 177

Bura-Worcester Acquisition of 100 common shares by D Edwin Gamble director making a total of 520; acquisition of 200 common shares by Lester G. Forier officer making a total holding of 200; acquisition of 152 common shares by E Swain Russey, director making a total holding of 502

Braniff Airways Acquisition of 1 000 common shares by Charles E Beard, officer and director making a total holding of 3,000; acquisition of 900 common shares by Eugene C Epsley director making a total holding of 5 900

Capital Airlines Acquisition of 100 common shares by James W Austin, officer making a total holding of 10 000; acquisition of 200 common shares by Hayes Dever officer and director, making a total holding of 675; disposal of 000 common shares by Charles H Murchison director leaving a total holding of 18,100; acquisition of 000 common shares by Thomas D Neelands, Jr director making a total holding of 6 500; acquisition of 100 common shares by Harold Byron Smith director making a total holding of 400; disposal of 300 common shares by Robert J Wilson officer; leaving a total holding of 700

Cessna Aircraft. Disposal of 700 common shares by Dwane L. Wallace officer and director leaving a total holding of 87,000

Chance Vought Aircraft Acquisition of 100 common shares by William W Overton Jr director making a total holding of 100

Continental Air Lines Acquisition of 200 common shares through exercise of option by George J M. Kelly, officer making a total holding of 000; acquisition of 1,200 common shares by C C West Jr officer and director, making a total holding of 1 440

Curtiss-Wright. Acquisition of 100 common shares by William T Lake officer, making a total holding of 400

Douglas Aircraft. Acquisition of 100 common shares by Stanley G Welsh director, making a total holding of 2 500

Eastern Air Lines Acquisition of 200 common shares by Leslie F Arnold officer, making a total holding of 3 800 acquisition of 500 and disposal of 955 common shares by Everett R Cook director making a total direct holding of 1 400 and an indirect holding of 300; acquisition of 240 common shares through exercise of option by Thomas E Creighton officer and director making a total holding of 300 acquisition of 200 common shares through exercise of option by Charles Froesch, officer making a total holding of 1,105; acquisition of 100 common shares by Morris M Frost officer making a total holding of 1 500 acquisition of 100 common shares by Stuyvesant Peabody Jr director making a total holding of 300

General Electric. Disposal of 000 common shares by William R. Herod officer leaving a total holding of 6,008

General Motors Acquisition of 000 common shares by Donaldson Brown director, making a total direct holding of 26 678 and total indirect holding of 105 270

B. F Goodrich Acquisition of 1 142 common shares by Arthur Kelly, officer making a total holding of 4 047

Lear Inc Acquisition of 2,700, acquisition of 2 000 common shares by Harold C. Andrus, officer making a total holding of 2 769 acquisition of 4 000 common shares through exercise of option by Richard M Mock officer, making a total holding of 16 538

Glenn L Martin Acquisition of 5 000 common shares through exercise of option by William E Bergen officer making a total holding of 7,164; acquisition of 1 100 common shares through stock dividend and disposal of 3 000 common shares by George M Bunker officer and director making a total holding of 10 000 disposal of 3 000 common shares by J E. Wharton, Jr., officer and director, leaving a total holding of 5,400

McDonnell Aircraft Corp Acquisition of 200 common shares by Kendall Perkins officer and director, making a total holding of 1 200

Minneapolis-Honeywell Regulator Co. Acquisition of 100 common shares by H F Dever officer making a total holding of 700; acquisition of 000 common shares by Alfred M Wilson officer and director, making a total direct holding of 1 022 and an indirect holding of 200; acquisition of 200 common shares by P E. Wishart officer and director, making a total of 1 000

National Aviation Disposal of 200 common shares by Frederick F Robinson officer leaving no holdings

Northrop Aircraft. Disposal of 40 000 common shares by William B Collins director, leaving a total holding of 13 330; acquisition of 411 common shares through exercise of option and disposal of 850 common shares by George Gore, officer leaving a total holding of 411; acquisition of 666 common shares through exercise of option by John W Myers, officer and director, making a total holding of 3 032 acquisition of 738 common shares through exercise of option by F. J. Peges, officer and director, making a total holding of 2,178

Northwest Airlines. Acquisition of 1 000 common shares by A F Tegen director making a total holding of 1 300

Pacific Northern Airlines Disposal of 1,500 common shares by Robert A Rowan, director, leaving a total holding of 13 667

Piper Aircraft Corp. Acquisition of 900 common shares by E N. Hunting, director, making a total holding of 1,000; acquisition of 000 common shares by Howard Piper officer and director making a total direct holding of 300 and an indirect holding 18,000; disposal of 500 preferred shares by E N. Hunting director, leaving a total holding of 100

Ryan Aeronautical Co Acquisition of 200 common shares by Emtor, Inc., leaving a total holding of 95,000; disposal of 1,000 common shares by Earl D Prudden officer and director, leaving a total holding of 9,000

Seaboard & Western Airlines Disposal of 1,000 common shares by Wallace F Neth leaving a total direct holding of 426 and an indirect holding of 20 649

Sperry Corp. Acquisition of 11,000 common shares by Charles M. Green, officer, making a total direct holding of 11 000; acquisition of 20 000 common shares by John Sanderson, officer, making a total holding of 24,300

Trans World Airlines Disposal of 350 common shares by George H Clay officer leaving a total holding of 1,331; acquisition of 648 common shares by John A Collings officer and director, making a total holding of 2 208; acquisition of 300 common shares by A V Leslie director making a total holding of 990; acquisition of 1 074 common shares by Warren L Pierson officer and director making a total holding of 2 000

United Aircraft Disposal of 2 000 common shares by William F Gwinn officer leaving a total holding of 3 480 Disposal of 1 000 common shares by Eric Martin officer leaving a total holding of 2 240



Tocticol Air Commond Gets New Thunderflash

Republic Aviation Corp has delivered the first RF-84F Thunderflash photo-recon jets for operational use Planes went to the 363rd Tactical Reconnaissance Wing, Tactical Air Command, Shaw AFB, S. C. The Thunderflash carries cameras in its long "solid" nose; air intakes for the Wright J65 turbojet are in the wing roots. An undisclosed number of RF-84Fs will be modified to be carried by a Convair GRB-36 bomber to permit longrange reconnaissance RF-84F is armed with four 50-cal machine guns.

This page for pilots only.

ON THE BUSINESS OF BECOMING UN-AIRBORNE

Some views expressed by various intrepid birdmen through the ages



"THE MOST IMPORTANT PART OF ANY FLIGHT IS THE LANDING"

–Icarus, son of Daedalus

Daedalus was the "do-it yourself" type He fixed up a couple sets of homemade wings out of wax and took son Icky for a short hop These were Icky's last words as the wax began to melt There's nothing home-made about the modern pilot's equipment To ease the strain in the air he has his auto pilot To ease the strain of landing he has HYTROL the Anti-Skid Braking System HYTROL can be engaged during approach ensuring positive directional stability immediately on touchdown



"I'VE GOT IT FIGURED HOW TO START FLYING WHAT BEATS ME IS HOW TO STOP"

–Leonardo da Vinci

Leonardo was a whizz at figures of all kinds However, even he would have been impressed by the figures on the stopping power of HYTROL Required landing run is reduced 33⅓% to 50% In other words, HYTROL virtually makes short runways longer!



"YOU MEAN AIRPLANE TIRES HAVE TROUBLE WITH FLAT SPOTS TOO?"

–Fifi Phalsephuont female fuselage expert

Fifi may not be the world's greatest aviatrix, but she knows something about pneumatics Anyone interested in tire life should know about HYTROL Because flat spots are eliminated with HYTROL tire life is both lengthened and made more uniform Tire changes can be anticipated and held to regular maintenance schedules Premature blow outs are prevented with HYTROL



"AHY LENDIHK IS HOT LENDIHK—VEN IS ON NICE!

–"Flat-out" Frijinsky, Air Hero of the Soviet Union

What's so tough about ice Fridge old boy? In C A A supervised tests on icy runways HYTROL gave straight controlled stops within 50 of certificated distances for dry runway conditions



"ANY LANDING IS A HOT LANDING—PEPIOD!"

–Cadet before first jet solo

The lad should have been told about HYTROL Not only does HYTROL automatically compensate for speed and weight of plane, type of surface, and condition of tires, it eliminates the human element in braking The least experienced pilot with HYTROL can make better stops than the veteran without HYTROL



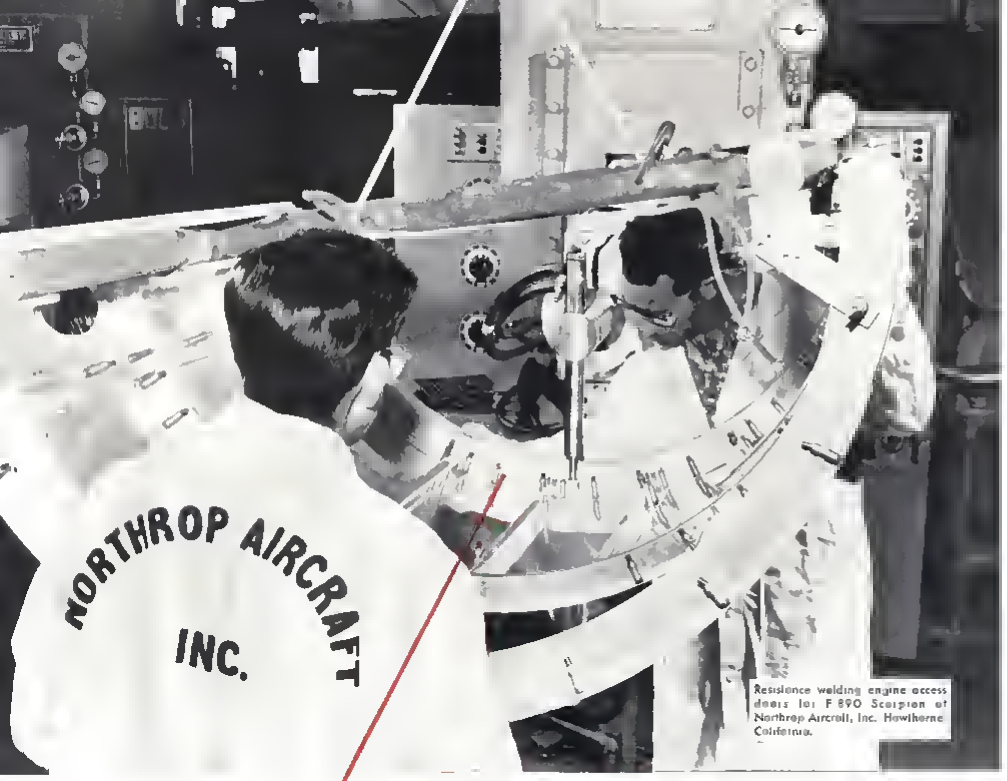
"GREATEST THING SINCE PONTIUS WAS A PILOT"

–Any pilot who's tried HYTROL from Nome to N'Gombo

HYTROL is light easy to install, compatible with standard brake systems May we hear from you?

HYDRO-AIRE Inc
3000 WINONA AVENUE, BURBANK, CALIF
A Division of Subsidiary of CRANE Co.

SAFETY PAYS OFF IN DOLLARS...INSTALL hytrol



Resistance welding engine access doors for F-89D Scorpion of Northrop Aircraft, Inc. Hawthorne California.

Primary Structures Prove Quality, Dependability of Resistance Welding

Production Costs Cut 60% on Typical Application



The USAF Northrop F-89D Scorpion, America's most heavily armed fighter type aircraft, is dramatic proof of the quality and dependability of Sciaky patented Three-Phase resistance welding. Such primary structures as engine access doors, keel, skin, wing tanks, and main landing gear doors are completely resistance welded. Almost all other assemblies are partially resistance welded. Write for the complete story of "Resistance Welding At Work" on the F-89D contained in Vol. 4 No. 4 and Vol. 3, No. 6.

Northrop's full acceptance of resistance welding is based on many years' experience—the 1933 experimental flying laboratory "Gamma" with spot welded wing skin proved weld integrity; the World War II P-61 Black Widow with spot welded twin tail booms proved impressive production economy of 60% over riveting.

The continuing increase of resistance welding at Northrop and other leading aircraft manufacturers is but a reflection of Sciaky basic thinking—welders designed to do *more useful work* at *lowest operating cost* with *maximum reliability*.

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY

Sciaky Bros., Inc., 4935 West 67th Street, Chicago 38, Illinois

P&WA Gets Writeoff For $1.1-Million

Pratt & Whitney Aircraft Division of United Aircraft Corp. has been granted a $1.1-million certificate of necessity for facility expansion by Office of Defense Mobilization with 65% of the amount allowed for rapid tax amortization.

Other certificates issued by ODM include:

Cochran Foil Co., Cochran Foil Products Division, Louisville, Ky., aircraft parts, $417,500 certified with 45% allowed.

Mueller Brass Co., Port Huron, Mich., aluminum forgings for aircraft, $656,900 certified with 75% allowed.

United Aircraft Corp., Hamilton Standard Division, Windsor Locks, Conn., aircraft parts $400,980 certified with 65% allowed.

Precision Gear & Products, Inc., Paterson, N. J., aircraft parts, $56,000 certified with 70% allowed.

Solar Aircraft Co., San Diego, aircraft parts, $561,048 certified with 50% allowed.

Westinghouse Electric Corp., East Pittsburgh, Pa., research and development, $746,390 certified with 65% allowed.

Ex-Cell-O Corp., Highland Park, Mich., aircraft parts $179,423 certified with 40% allowed; Lima, Ohio, aircraft engine parts, $33,990 certified with 65% allowed.

Douglas Aircraft Co., Santa Monica, Calif., military aircraft, $491,339 certified with 65% allowed.

W. L. Maxson Corp., New York, military electronic equipment, $27,050 certified with 65% allowed; Old Forge, Pa., military electronic equipment, $4,997 certified with 65% allowed.

Holley Carburetor Co., Detroit and Van Dyke, Mich., aircraft engine parts $22,173 certified with 70% allowed.

Penwal, Inc., Ashland, Miss., scientific instruments for defense, $21,296 certified with 70% allowed.

United Aircraft Products, Inc., Dayton, aircraft parts, $51,982 certified with 65% allowed.

Bendix Aviation Corp., Friez Instrument Division, Towson, Md., scientific instruments for defense, $12,659 certified with 65% allowed; Pioneer-Central Division, Davenport, Iowa, aircraft parts, $74,681 certified with 65% allowed; Eclipse-Pioneer Division, Teterboro, N. J., aircraft parts, $30,900 certified with 65% allowed.

Lockheed Aircraft Corp., Burbank, Calif., military aircraft $66,639 certified with 65% allowed.

Navy Balloon Flights Study Cosmic Rays

First of 12 flights of high altitude balloons has been launched from Goodfellow AFB, Tex., to study cosmic rays, the high energy particles from outer space.

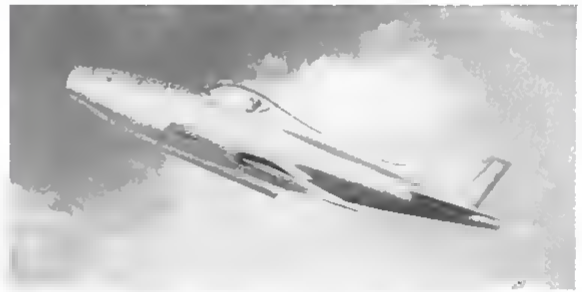
The experiments are sponsored by the Office of Naval Research and the Atomic Energy Commission. Each balloon carries up to 150 lb. of apparatus.

Navy hopes to have each flight remain for several hours at altitudes between 90,000 to 100,000 ft. After each flight ends, the instruments are carried to earth by parachutes.

Office of Naval Research has sponsored the Skyhook flights for eight years, making the investigations at various altitudes from the equator to the North Pole.

NCA-Purdue Split

North Central Airlines has refinanced the $600,000 balance of a loan from the Purdue Research Foundation with the Northwestern National Bank of Minneapolis. The move divests the Purdue Foundation of all interest in North Central.



Italians Seek Lightfighter Market

Designed for fast, economical production by countries with small airpower budgets, this lightweight jet fighter is nearing completion at the Italian Aerfer plant near Naples. Named the Sagittario 2, the craft has 45 deg. swept wings, is powered by a single Rolls Royce Derwent in the nose exhausting under the mid fuselage. Aerfer also has made studies involving use of an axial flow turbojet and installation of a tail engine.

NEW
• NON-STICK
• NON-FREEZE
• FREE-SLIDING
SKIS



FLY ANYWHERE with FEDERAL ALCAN BUSHMASTER "LDR" SKIS

SURE TAKE-OFFS — SAFE LANDINGS under EVERY snow condition!

Federal "LDR" Ski Bottoms are made of a tough, armor-like plastic that is developed and processed to provide uniform snow operations ordinarily associated with wheel performance. "LDR" ski bottoms give free sliding take-offs and landings even under the severe conditions of "sticky," "frosty," "sandy," "slushy" snow and withstand the abuse of ragged glare ice conditions.

INSIST ON GENUINE FEDERAL "LDR" PLASTIC SKI BOTTOMS!

The basic composition and processing of Federal "LDR" ski bottom plastic was developed as a result of a 4 year investigation and test of various materials and plastics. Although many plastic materials have the exact appearance and many of the basic compositions they failed to produce the universal ski bottom performance of the Federal "LDR" plastic. Where ski performance failure is experienced using other plastic materials do not confuse these materials with genuine Federal "LDR" Non-Stick, Non-Freeze, Free-Sliding Plastic Ski Bottoms.

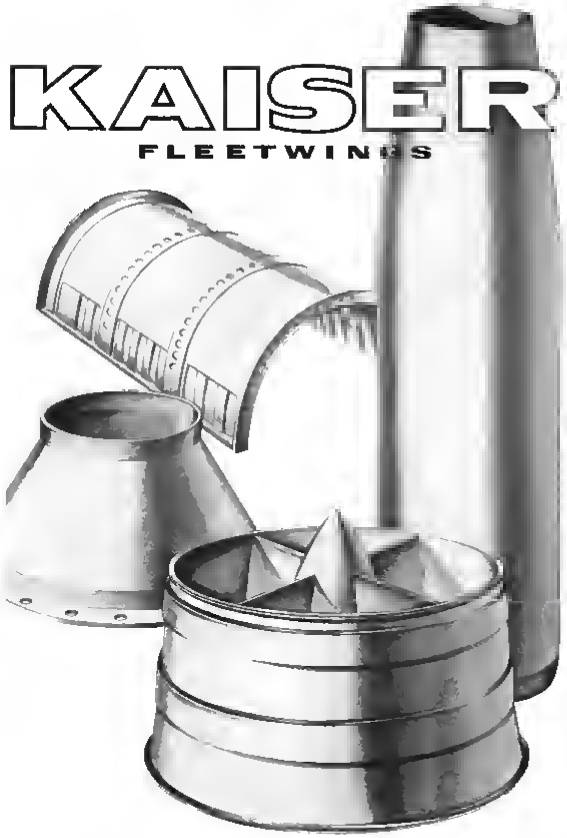
★★★

Modernize present skis with "LDR" Bottom Conversion Kits. Federal "LDR" ski bottom surfaces can be readily installed on your present Federal skis. Contact your Federal distributor for complete information about this newest aircraft ski development.

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KAISER
FLEETWINGS



FABRICATOR OF JET ENGINE COMPONENTS

Do you need jet engine components? We have the engineering ability, the production facilities and ingenuity, the experience in forming, welding and machining of high temperature alloys required to fabricate precision parts. These four units—compressor casing, bearing air seal, exhaust duct and cone assembly, inner combustion liner assembly—are good examples of the tough jobs we like to tackle and do.



On the mainline of the PRR midway between Trenton N.J. and Philadelphia Pa.

FLEETWINGS DIVISION
KAISER METAL PRODUCTS, INC.
BRISTOL, PA.
IN THE HEART OF THE DELAWARE VALLEY

WHAT'S NEW

New Publications

Value of conservation practices to military services and industry, including how costs are cut through use of a proven program, is subject of a new booklet available to defense contractors from the Resources Branch, Newark Air Procurement District, 218 Market St., Newark, N. J.

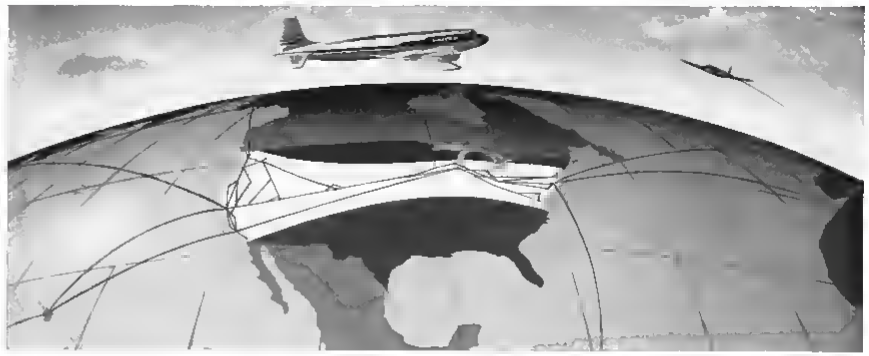
Many methods of solving linear equations and inverting matrices are provided in Contributions to the Solution of Linear Equations and Determination of Eigenvalues, edited by Olga Taussky, National Bureau of Standards Series 39, 139 pages. Price is $2.00. Order from Government Printing Office, Washington 25, D. C.

Telling the Market

Electric resistance welding is detailed in 12 page Bulletin 333, divided in four sections: industrial applications, manufacture and service, operating principles and types of machines. Write Sciaky Bros., Inc., 4915 W. 67th St., Chicago. **How to weld, braze, solder and cut steel** with alloys and fluxes developed to minimize job costs is subject of new pocket size folder which also gives data on a new high-speed chamfer rod, a special electrode that will not freeze to the work, a paste solder and a cold applicable metal filler. Available from All State Welding Alloys Co., Inc., 249 55 Ferris Ave., White Plains, N. Y.

Illustrated brochure describes facilities of Avio-Diepen, located at Ypenburg Airport, The Hague, Holland. Brochure notes that no customs duty is paid on spares bought at the airport, whether they are installed in the aircraft or carried away for later installation. Payment is accepted in any currency. Kohler Co. describes the wide range of components it makes and markets in new 24-page catalog. Company's line includes various types of **hydraulic and pneumatic valves, jet engine components and engine primers.** Write Precision Controls Div., Kohler Co., Kohler, Wis. **"Precise output"** 400-c. synchronous driven, **40-pole alternator M-G sets,** known as the Series 400 line, are described in 6 page brochure put out by Palmer Electric Mfg. Co., 6629 Bear Ave., Bell, Calif.

Glenn L. Martin Co. has published 34-page brochure on **Marbond honeycomb process.** It is available to engineers and industry executives. Address Baltimore 3, Md. **Why Abrasive**



Send it 'round the U.S. or 'round the world



by United's Reserved Space Air Freight plan

It's almost like having your own private shipping space for use at will—for fast, dependable deliveries between 80 cities coast to coast, to Hawaii, to anywhere in the world. For United Air Lines now offers *world wide* Reserved Space Air Freight to 84 countries, under a new interline agreement.

Reserved Space Air Freight is carried on both United's Cargoliners and most regular Mainliner® flights, around the clock. It's offered after consideration of air mail and air express needs, and it's a service in the U.S. only United Air Lines offers.

Send your shipments coast-to-coast in less than 8 hours via DC-7 Mainliners—border to border, 'round the world on convenient connecting schedules. Service like this makes and *keeps* new customers, taps new supply sources. Ask your local United office about the economy, speed and dependability of United's Reserved Space Air Freight plan. Also write for United's new booklet "Industry's Flying Partner," Cargo Sales, Dept. J, 5959 South Cicero Avenue, Chicago 38, Illinois.



More than 225 Mainliner flights daily—Air Cargo on every one

ROLLS-ROYCE

makers of aero engines

for forty years,

make the

DART

PROPELLER TURBINE ENGINES

which power the

Vickers Viscount airliners

ordered by Capital Airlines

for domestic services

in the U.S.A.

ROLLS-ROYCE AERO ENGINES FOR SPEED AND RELIABILITY

ROLLS-ROYCE LIMITED · DERBY · ENGLAND

Wheels Fail—Sometimes is title of 40-page illustrated pocket-size book for users of abrasive cutting equipment. Book is sent free if request is on company letterhead, otherwise price is 50 cents. Write Wallace Tube Co., 1304 Diversey Parkway, Chicago 14. A. O. Smith Corp.'s Aeronautical Division has published a 26-page brochure, **Engineering Designs for Optimum Structures**, describing the company's metal working abilities. Write F. A. Cruetjen, Director of Aeronautical Development, A. O. Smith Corp., Milwaukee 1.

OVERSEAS SPOTLIGHT

Sopwith Asks Dual Defense

LONDON

Britain's hope of survival in the hydrogen age lies in "so building our strength and our airpower that no one will dare attack us," says Sir Thomas Sopwith, chairman of the Hawker Siddeley Group.

In presenting the company's annual report, Sir Thomas says that pushbutton warfare is "still in the test tube stage." For some years to come, he believes, Britain faces a dual threat from a possible aggressor. Sneak atomic attack and local aggressions such as Korea, Indo China, Malaya, etc. To meet it, he calls for a dual emphasis. First on the latest fighters and bombers, second on atomic carriers, rockets, missiles.

In reviewing the Hawker Siddeley Group's achievements for the fiscal year that ended July 31, Sir Thomas reports a "trading profit" of $19.6 million after special deductions. The comparable figure for 1953 was $14 million. The chairman applauds Britain's introduction of investment allowances to cover depreciation, but deplores the 50 year amortization period as unrealistic. (In the U. S., aircraft companies are eligible for five year amortization of certain new facilities.)

The company expects that development and delivery of new military aircraft will be speeded by the new government policy of awarding good-sized production orders along with prototype orders. Past policy has been to order one or two prototypes only, withholding large scale orders in the early stages of a new plane's development.

Among highlights for the year. The company produced its 10 millionth gas turbine blade, the firm has $18.4 million in U. S. offshore procurement orders for the Sea Hawk Navy fighter.

Divisions of the Hawker Siddeley Group include A. V. Roe, Avro Canada, Hawker, Gloster, Armstrong Siddeley and Armstrong Whitworth.

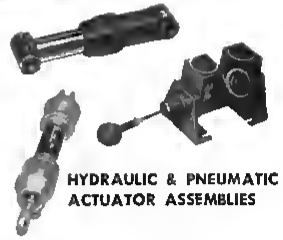
XLO

Ex-Cell-O Precision at Production Prices





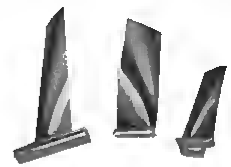
FUEL CONTROL AND METERING ASSEMBLIES



HYDRAULIC & PNEUMATIC ACTUATOR ASSEMBLIES



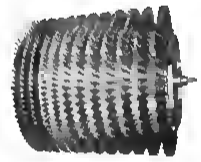
FUEL NOZZLES FOR JET ENGINES



JET ENGINE BLADES



MISCELLANEOUS AIRCRAFT AND COMMERCIAL PRECISION PARTS



JET COMPRESSOR ROTORS

Ex-Cell-O's facilities include laboratory control of materials, design and process engineering, machining of all materials, complete quality control to meet the most rigid specifications, and delivery to meet customers' requirements.

For information or a quotation, write or phone the Precision Products Division of Ex-Cell-O.

54 23

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MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



'KEEP IT SIMPLE' was Heinemann philosophy for design of Douglas A4D Navy attack plane. The story below tells how ...

Simplicity Pays Off in Skyhawk Design

El Segundo, Calif.—Simplicity which has made the Douglas A4D Skyhawk a lightweight aircraft also has made it an easy aircraft to produce.

New production techniques have been made possible by the "package" design of the sturdy "Heinemann Hot rod." Full advantage of the simplification now is being realized as the A4D project group shifts from an experimental to a production organization.

The usual technique of building two experimental aircraft and one static test model before going into production was dispensed with in the case of the A4D. The initial Navy order was for a given production rate and the first aircraft was built with production tooling.

► **Early Hurdles**—The innovation was not without its problems. Tooling troubles with a big wing spar machine set the program back 15 weeks at one point. Most of the lost time was regained but, even so, the first aircraft made its maiden flight almost four weeks behind schedule. The comeback was rapid. The second Skyhawk was right on schedule and the third flew two weeks early.

Limited production also was delayed slightly by the insistence of designer Ed Heinemann and project engineer Ben Collins on lightweight and small size for each component that went into the aircraft. This at times involved redesign of subcontracted articles.

"One of the most alarming consequences of the trend toward increased size and weight is the effect this trend exerts on defense costs," says Heinemann, chief engineer of the Douglas El Segundo division. "Evaluation of any weapon must include the cost of that weapon and the numbers that can be procured with a fixed budget or the man hours available for production and maintenance."

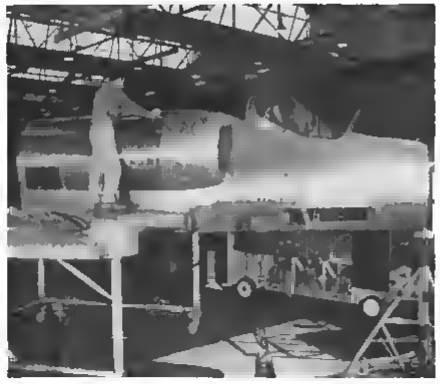
Heinemann believes it is important that designers, equipment manufacturers, and procuring agencies clearly understand the relationship between weight-saving and cost.

Estimating that on the average a pound of weight costs $50 to develop and produce, Heinemann points out that when this is combined with a typical weight growth factor of 10, the cost of one pound of extra weight amounts to $500 per airplane if performance and strength are maintained. He also points out that a decrease in airplane size permits further cost savings through application of the learning process.

"It can be shown," says Heinemann, "that 2,400 fifteen thousand-pound airplanes can be built for the same cost

Production sequence shows how major A4D components are assembled at Douglas-El Segundo







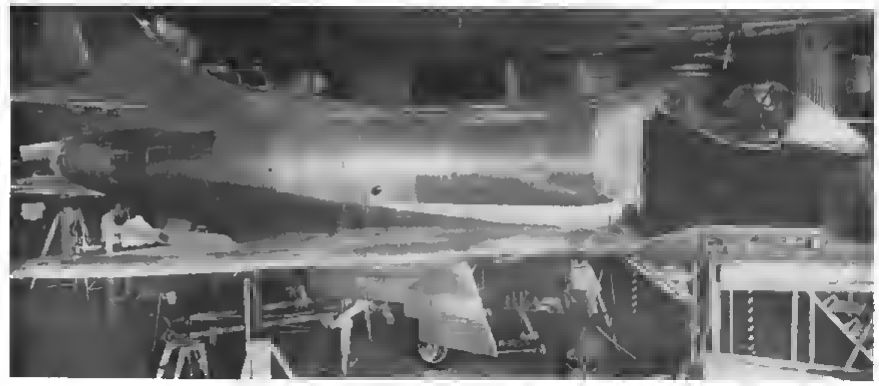
1. **WING** contains three main spars and two large panels



2 **IN HORIZONTAL JIG** with top and lower skin attached



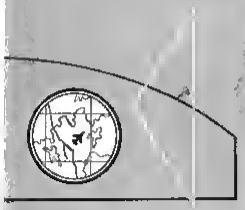
3 **FABRICATION COMPLETE** except for wingtips and interior accessories. Once subassembly is finished, there is no need to enter wing tank area until final assembly.



advanced technique

AVIONICS

fighter situation display by AVION



Fighter Situation Display (FSD) is an automatic, continuous indication on a map of the aircraft position during flight.

Developed by Avion for the Air Force, FSD eliminates manual computation and facilitates pin point navigation.

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as 1,000 thirty-thousand pound airplanes."

▶**Simple and Small**—Simplified design of the A4D also results in a more simplified production facility. The Skyhawk is produced in four major components: forward fuselage, aft fuselage, wing and engine. A large facility is not required for assembly since the components not only are small but can be handled as separate sections.

It is possible, for instance, to check out the electrical and hydraulic systems of the forward fuselage before mating it to the wing. Final assembly consists of an unusually short line, with stations for only nine aircraft.

Simplicity again is the key to rapid movement on this line. Mating of the wing to the fuselage is by bolts on each side. A terminal panel provides swift electrical connection and there are bulkhead fittings for the hydraulic system. Control cables are connected by turnbuckles.

On the aft fuselage, there is only one electrical plug with quick disconnects for cables and the hydraulic system. Advantages of this during engine change are obvious.

Both the aircraft and the assembly line are designed so that much of the work can be done from floor level.

▶**New Plant**—Effect of these new production concepts is evident in the new facility Douglas-El Segundo is building solely for A4D production. The plant consists of three bays, 440 ft. long and 120 ft. wide, linked by office buildings. Total area is 186,000 sq. ft. and it will be one of the most modern aircraft plants in the nation.

Meanwhile, early Skyhawks are being turned out in one corner of the main El Segundo plant. Norman E. Heath, assistant superintendent in charge of A4D manufacturing, in a tour of the assembly area, points out some of the techniques that have made production easier and less costly.

One is standardization, as in rivet sizes. All rivets on the upper and lower wing panels and spars are the same size. Wherever possible, the same applies to the fuselage.

▶**In the Wings**—Since small size of the Skyhawk eliminates the need for folding wings, production of the wings is simplified. The wing is assembled from three main spars and two large panels. This construction minimizes leaking problems for the integral fuel tanks. The wing also is designed so that once subassembly is complete and the tank sealed there is no need to enter the tank area for any purpose during final assembly. The Skyhawk, incidentally, also carries a self-sealing fuel tank behind the pilot in addition to the integral wing tanks.

"A source of substantial structural



ONE HAND is all that WAVE needs to hold A4D's lightweight ejection seat aloft.

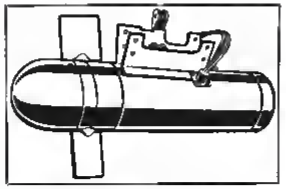
gain has been the replacement of complicated, built up structural sections by simpler machined parts," says chief engineer Hememann. "Wing spars are a familiar example of this type of transformation. Further improvements along these lines are dependent only on the development and availability of machines capable of handling larger components."

Among the newer materials with higher strength-to-weight ratio or better high-temperature characteristics used in the Skyhawk is SAE 4340 steel heat-treated to 260,280,000 psi.

▶**Wind-Driven Generator**—Swifter production also is possible as the result of a number of other design innovations. The A4D has no emergency hydraulic system and no battery. It carries instead a wind driven emergency generator, equipped with a manual release which can flop the generator into the windstream at any speed not in excess of 400 knots.

The generator, made by Allison-Aeroproducts for Douglas, is turned by a two bladed, variable-pitch propeller. A simple, flyweight type governor, independent of any of the plane's systems, maintains the generator at a constant rpm, by mechanically changing propeller blade pitch. When extended into the air stream, the propeller will unfeather and accelerate to design speed in five seconds.

Since there is no emergency hydrau



EMERGENCY generator is wind-driven.

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Bendix Pacific Telemetered instrumentation provides you with six distinct advantages over conventional methods.

1. *The information is instantly transmitted to a conveniently located receiving station where technicians can study and direct the procedures while the test is in progress*
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8490

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he system, the nosewheel and main gear are designed to drop aft in free fall. The ejection seat is some 58 lb. lighter than previous models.

These design factors together with application of latest production techniques and machinery make it apparent why the company predicts that the A4D can "roll off the assembly line like oranges."

Aviation Safety Studies Available

Flight Safety Foundation is making available a series of non-technical reprints covering research and development in aircraft design and operation.

Copies of the reprints are available from FSF. Make payment by check or money order. Prices for quantity orders are available on request. Address: Flight Safety Foundation, Inc., 471 Park Ave., New York 22, N. Y.

Other reprints were listed in AVIATION WEEK Dec. 27, p. 32.

• **The Common Man—Up in the Air.** The psychology of passenger reactions in flight. Howard G. Kurtz, jr. Reprint by IAFA from Flight Safety Foundation. Price 10¢.

• **Hail.** Excerpts from TN 2734, "Summary of Available Hail Literature and the Effects of Hail on Aircraft in Flight." Souter and Emerson, NACA. Pub. by Flight Safety Fdn. 18 pp. March 1953. Price 25¢.

• **Passenger Seating Position in Emergency Landings.** Discussion of possible seating positions for crash protection, including comments by experts in this field. Arne Aime, Scandinavian Airlines System. Published by Flight Safety Fdn. 12 pp. May 1953. 25¢.

• **Current Levels of Aircraft Safety.** Various factors in management, education and research affecting safety, also charts showing recent progress. J. Lederer, Flight Safety Fdn.; IAS Washington Section. 11 pp. April 1953. Price 50¢.

• **Crash Survival & Crash Fires.** Review of the record and suggestions for reducing hazards. D. L. Fosner, CAA. IAS Washington Section. 18 pp. April 1953. Price 50¢.

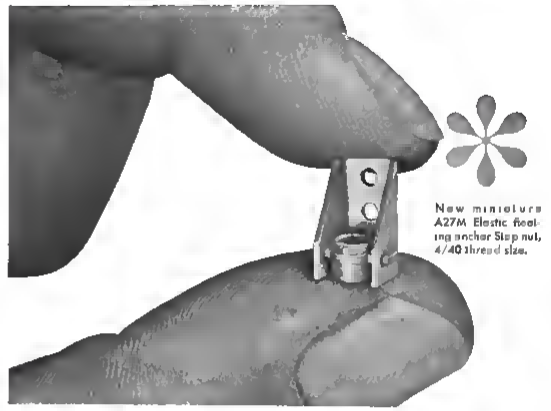
• **Air Safety Seminar.** Summary of program and discussions at Seminar conducted by Flight Safety Foundation at College of Aeronautics, Cranfield, England. September, 1953. 6 pp. Price 25¢.

• **Ditching.** Discussion of ditching under night and instrument conditions, presented to Air Safety Seminar, Cranfield, England. Lt. Cdr. J. M. Waters, Jr. USCG. 8 pp. Sept., 1953. Pr. 25¢.

• **Crash Survival Study.** National Airlines DC-6 accident at Elizabeth, N. J. Thorough study of a severe accident in which 54% of the passengers survived. Illus. A. H. Hasbrook. Aviation Crash Injury Research. 75 pp. Oct. '53. Pr. 50¢.

• **Management's Economic Interest in Safety.** Costs of damage through handling, maintenance faults and equipment loss as well as for a major accident. C. M. Christenson, United Air Lines, IAS An-

FASTENER PROBLEM



Special fastening methods required by miniature electronic subassemblies

Extension of aircraft weight reduction programs to include the electronic units carried by the air frame has resulted in miniaturization of component subassemblies and parts. Standard sized fasteners would defeat the purpose of the program and are impractical because the smaller units have insufficient space to permit efficient handling and wrenching. The necessity for "blind-mounting" components or cover plates presented further difficulties, particularly in production and maintenance, because of minor subassembly misalignments. ESNA engineers were asked to design a reduced dimension anchor nut to meet these special requirements.

The new miniature A27M Elastic Stop nut is a right angle floating anchor nut, with envelope dimensions as small as .344" x .455". It permits minimum mounting area and, because of its "float," engages easily in spite of minor misalignment of components.



Like all Elastic Stop nuts, the A27M is self-locking, vibration-proof and reusable. As a "stop" nut the tight grip of the red elastic locking collar maintains a precise adjustment of a bolt at any predetermined point along its threaded length. And it is far simpler and less expensive to assemble than double nuts or soldered units.

MAIL THE COUPON FOR DESIGN INFORMATION

ESNA

Elastic Stop Nut Corporation of America
Dept. N72-125, 2332 Vauxhall Road, Union, New Jersey

Please send me the following free fastener information

☐ Details on Miniature A27M Floating Anchor

☐ Details on Type 1660 Miniature Hexagon Nuts.

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Edgewater

rolled steel

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for

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• save machining time

• save costly material

Edgewater weldless rings, rolled from solid steel blocks, are made in diameters from 5 inches to 180 inches, and weights up to 14,000 pounds. The cross-section drawings above show some of the shapes produced by the Edgewater rolling process. Simple or complex sections are accurately formed, minimizing machining operations, and reducing material costs.

Among the applications for which Edgewater Rolled Steel Rings are recommended are: turret gears, shroud rings, compressor rings, spacer rings, parts for reciprocating engines.

WRITE for free booklet describing how Edgewater Rolled Steel Rings are made and showing some of the rolled-sections produced by this process



EDGEWATER STEEL COMPANY

PITTSBURGH 36, PA.

nual Meeting, paper 14 pp January, 1954 Price 50¢

• **Survey of Research Projects in the Field of Aviation Safety.** Third annual supplement in what has become a "bible" to research personnel, engineers, and operators. Lists current and completed projects in various fields. Cornell Guggenheim Aviation Safety Center. 117 pp. Jan. 1954 (See also #24) Pr. $1.00

• **Flight Aspects of the Mountain Wave.** Graphic description of flight through severe wave pattern. A sequel to "The Mountain Wave." Jenkins Kuettner, USAF Cambridge Research Center, publ. by Flight Safety Foundation. 15 pp. May 1954. Price 50¢

• **Thunderstorms, Turbulence, Lightning.** The ABC's of flight in heavy storm areas. Flight Safety Foundation. 12 pp. March 1954. Pr. 25¢

• **Reliability by Isolation, Duplication or Triplication.** Probability calculations applied to aircraft design. Walter Tye, Air Registration Board, London, reprint from Journal Royal Aero Society, March 1954. Publ. by Flight Safety Fdn. 8 pp. Price 25¢

• **Jet Engineering Problems.** Discussion of design factors affecting safe and efficient operation as experienced in USAF. Sydney Berman, Dir. of Flt. Safety Research. Publ. by Flight Safety Foundation. 8 pp. Dec. 1953. Price 25¢

• **Crash Survival Study of Piper PA 11 aircraft,** an example of a severe crash in a light airplane, with findings and recommendations. Illustrated. A. H. Hasbrook, Aviation Crash Injury Research. 19 pp. May 1954. Price 25¢

• **Stand by to Ditch.** Concise illustrated description of ditching techniques. Cdr. J. A. Cornish, USCG. Published by Flight Safety Foundation. August, 1954. Price 25¢

• **Crash Survival Study of de Havilland Dove accident, Dec. 1952.** Illustrated analytical study of crash of a small business airplane. A. H. Hasbrook, Avia. Crash Injury Res. 35 pp. November 1954. Price 50¢

Helmet Protects Against Jet Noises

High frequency noises of jet and turboprop planes are kept from the ears of pilots and crewmen, yet conversational tones are transmitted, by a new fiberglass shell helmet weighing only 2



CONVERSATION gets through headgear.

FLAME-PROOF FABRIC CONNECTOR ELIMINATES

"fire zone" fatigue



CASE HISTORY

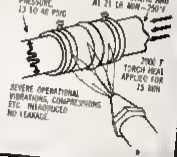
ARCOSIL RUBBER IMPREGNATED FIBERGLASS CONNECTOR PERFORMS AFTER 2000° FIRE TEST

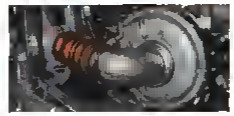
To eliminate fatigue failures of metal connectors on aircraft supercharger intake ducts Arrowhead designed a replacement part from ArcoSil silicone rubber fiberglass material. Tests were made to determine fire-resistant and fire-proof characteristics of supercharger inlet duct connector.

TEST CONDITIONS. Required to withstand 2000° F flame for 15 min. Pressure 13 PSIG internal air flow static and 21 lb./min. at 250° F internal air temperature.

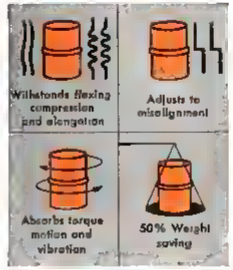
RESULT. After severe flexing, conductor with stood 40 PSIG pressure with no leakage.

C.A.A. APPROVED.





ArcoSil connector replaces metal on supercharger intake duct





Many types and sizes

ARCOSIL FIBERGLASS DUCTING OFFERS *NEW* DESIGN APPLICATIONS

New techniques developed by Arrowhead in fabricating complex ducts, sleeves and couplings from ArcoSil flexible silicone rubber impregnated fiberglass have opened amazing new design possibilities. In addition to ArcoSil's ability to withstand heat, vibration and torque-motion-fatigue, the materials permit the parts to be formed to almost any conceivable shape and size to meet individual specifications.
A variety of standard constructions offers serviceability under extreme high and low temperatures and at various pressures.

Close tolerance tooling and production costs are cut to a fraction, as compared with metal, to effect sizeable savings in either experimental or production quantities. Up to 50% weight reduction is possible. Flexibility permits crushing without damage and simplifies installation.

Arrowhead specializes in solving difficult flex-connector problems in fuel, oil and air systems. Arrowhead field engineers will gladly provide further information and assistance.

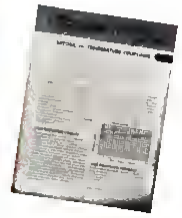
WRITE FOR ENGINEERING BULLETIN describing complete line of ducts, sleeves and couplings

ARROWHEAD RUBBER COMPANY

Division of National Motor Bearing Company, Inc.

2330 CURRY STREET, LONG BEACH, CALIFORNIA

Pioneer fabricators of silicone rubber; Originators of rubber-fiberglass ducting





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West Coast Sales and Service: 117 E. Providencia, Burbank, Calif.
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.
Canadian Distributor: Aviation Electric Ltd., P. O. Box 6102, Montreal, P. Q.

lh In addition, the headgear complies with military specs for impact resistance, the manufacturer notes.

A number of the new Sound-Absorb helmets have been sold to the armed forces, Convair, Goodyear, Hughes and Douglas. Initially marketed eight months ago, the maker is retooling for major production of the item.

The headgear is made in one small and one large size. It is lined with foam padding and normal perspiration and evaporation cooling is permitted using a removable rayon liner which leaves an air space and can be snapped into place. An earphone plug is included. Price $92 each in quantities less than 20.

Bill Jack Scientific Instrument Co., Solana Beach, Calif.



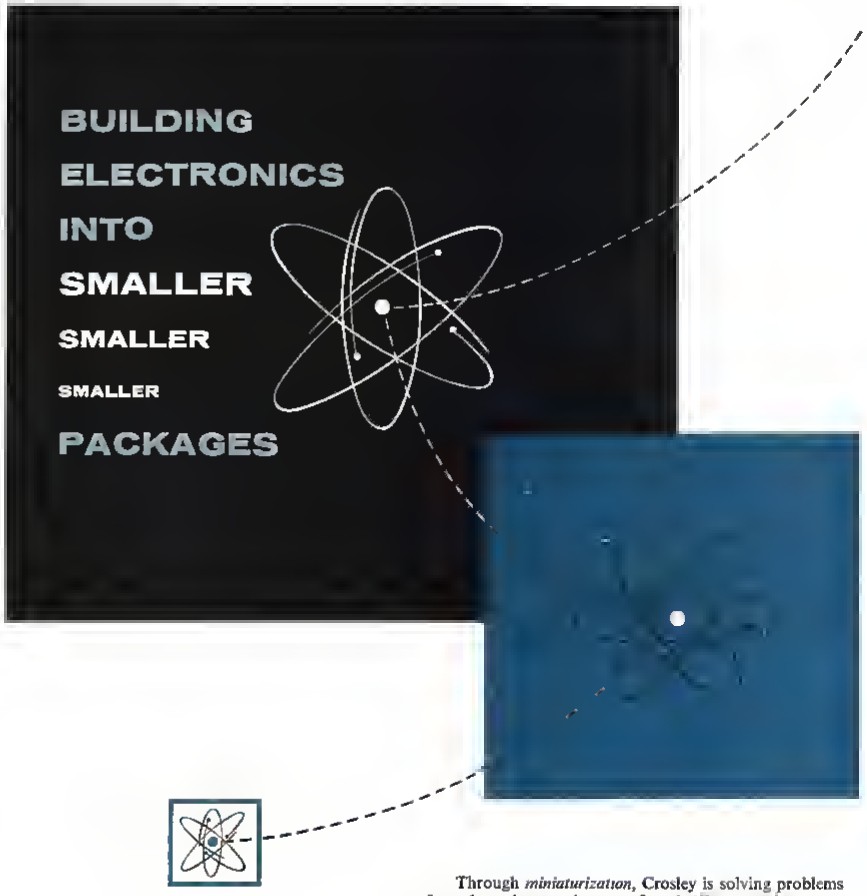
Lightening Holes Cut In One Operation

One operation is all it takes to rout lightening holes in router template blocks using the homemade guide (picture above) that does the work within tolerance with no sanding or filing needed to get final accuracy. In addition it saves 15 min. per form block, says Temco Aircraft Corp.

Three basic key members are used: a 9-in. vertical shaft held by a screw-type guide head, a 13-in.-long crank attached horizontally to the top of the shaft and a 6-in. track attached horizontally to the bottom of the vertical shaft. The tapered point travels on the track by means of a screw traverse.

A 6-in. scale on one side of the track is graduated in tenths of an inch; the circular scale at the end of the track in thousandths.

When the two handles that actuate the screw traverse are revolved, the indicators on both scales move along with the tapered point. When the point is properly positioned, it is lowered into the template plate's pilot hole, where it centers automatically. The crank is turned, one counterclockwise revolution revolving the plate over the router blade. Cuts can be made up to 8¼ in. diameter.



Through *miniaturization*, Crosley is solving problems of weight and size reduction of vital military equipments and systems—increasing performance and reliability.

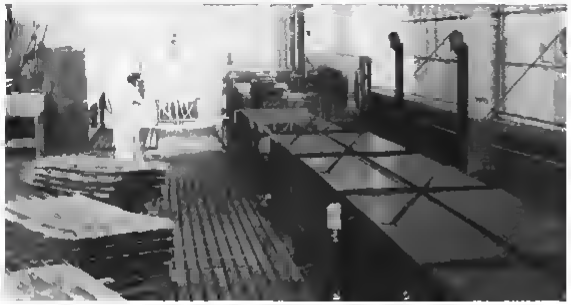
Typically, Crosley's modified Glide Slope-Localizer Receiver—now 40% lighter and 24% smaller—requires less power, provides greater flexibility, easier installation and maintenance.

And Crosley's advanced techniques in miniaturization find equal application wherever weight and size must be held to a minimum. Why not let Crosley *reliability* do the job *right* for you?

For Procurement Agencies and other defense contractors: an illustrated brochure describing Crosley's complete facilities. Write for your copy today, on your business letterhead.

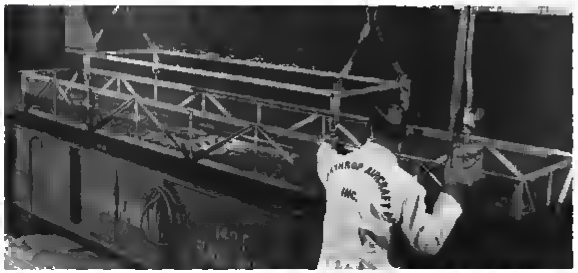
CROSLEY GOVERNMENT PRODUCTS DIVISION — AVCO MANUFACTURING CORPORATION

CINCINNATI 15, OHIO

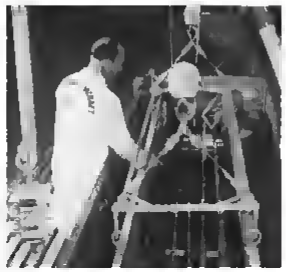


LARGEST DY CHEK inspection facility in the U S (left), covering 3 750 sq. ft , is the one at Northrop Aircraft, Inc , Hawthorne, Calif , the company states Dye penetrant process, developed by the plane maker several years ago, is used for F-89 Scorpion all-weather fighter and B-62 Snark pilotless bomber major components. It takes only two men to handle the inspection process on each shift. For safety, lids of 700-gal tanks close automatically in event of fire and a quick-drain system flushes liquids into an underground recovery tank

Northrop Installs Biggest Dy-Chek Facility



1 **REMOVED** from Dy Chek tank spar caps "dwell" (soak) Excess fluid drains into tank



2 **SPRAY** aids dye removal process.



3 **WASHING** removes excess dye after softening process.



4 **OVEN** dries parts by means of 150F electric heat



5 **DEVELOPER** spray bath brings out any flaws in parts



6 **FLAW** (right) is prominently revealed by Dy-Chek



Air Force jet pilots at Alexandria AFB, La , recently gave Spar a rugged workout, flying over 1,000 F86D night sorties "by the dials" and coming in on Spar to perfect landings every time

Have you flown against SPAR?

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The weather's rotten.

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The *lone* Spar operator brings you in to a perfect landing right along the runway centerline. Easy and foolproof, Spar has been completely tested by commercial, military and private air interests. It is a precision product of the Laboratory For Electronics, Inc., developed to fill the need for all-weather, all-hours safe landings. Contact the Laboratory for complete details. Foreign inquiries, contact Bendix International Division, 205 East 42nd St., New York, N. Y.

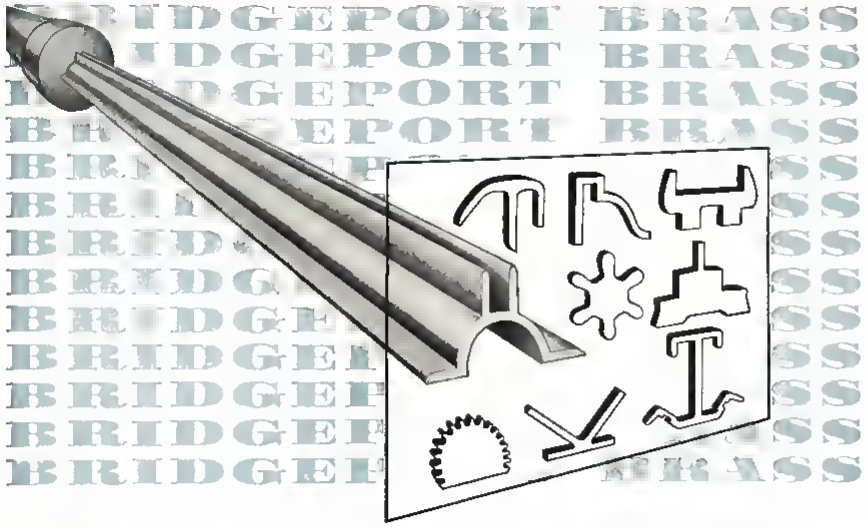


Spar, easily transported via C-47, can be flown to forward airstrips or isolated bases.

LABORATORY FOR ELECTRONICS, INC.

75 Pitts Street Boston 14, Mass.

L/E SPAA



BRIDGEPORT ALUMINUM EXTRUSIONS

—your key to economy, strength and simplified production

Bridgeport Aluminum Extrusions are helping to increase production efficiency in more and more plants every day. Here's why extruded shapes can lower costs and improve a wide range of products:

Production is simplified—extrusions often eliminate the complex assembly of many components.

Costs are lowered—extrusions reduce time-consuming machining and assembly operations. There's a substantial saving in materials too.

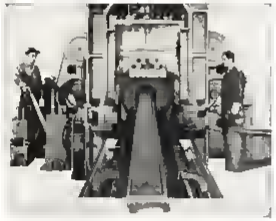
Unlimited design possibilities—high strength permits an almost endless variety of precision, close dimensional shapes. The relatively low cost of dies for custom-tailored shapes can make special designs practical for experimental work and new applications.

Improved weight-strength ratio—extrusions are usually lighter and stronger than machined parts.

Bridgeport's experience and complete extrusion facilities offer manufacturers an opportunity to put the advantages of extrusions to work for them—in aircraft, or in architectural and industrial applications. Call your Bridgeport Sales Office for further information or technical help.



Skilled hands and a completely equipped die shop insure accuracy and speed on Bridgeport extrusion deliveries.



Your requirements in any alloy now being extruded can be supplied by Bridgeport. Largest of 16 presses has 5500-ton capacity

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PRODUCTION BRIEFING

► Special B-47 modifications on a quantity of operational Stratojets will be performed by Marietta Division of Lockheed Aircraft Corp. This is Lockheed Marietta's fourth B-47 contract.

► Solar Aircraft Co., San Diego, Calif., is selling its stainless steel foundry to a newly formed affiliated corporation—Pacific Alloy Engineering Corp. PAEC will establish its foundry in El Cajon, a San Diego suburb. Solar will own a minority interest in the corporation. Foundry equipment will be moved into the new facility early in March with no loss in deliveries planned for Solar's present customers. Allen M. Shichter, president of Pelton Steel Casting Co., Milwaukee, will also be president of Pacific Alloy; Walter H. Dunn, head of Solar's facility, will be vice president-general manager, and O. E. Eggen will be vice president-sales and engineering.

► Robinson Aviation, Inc., Teterboro, N. J., has appointed J. M. Waltheu Co., Boeing Field, Seattle, its representative for Washington, Oregon, Idaho and Montana.

► Aluminum Company of America expects to have in operation in early 1956 a 100-in. cold mill for finish rolling wide aluminum coiled sheet. New facility will cost more than $5 million.

► Fairchild Camera & Instrument Corp., Syosset, N. Y., plans construction of a 24,000-sq.-ft. plant in Los Angeles, to house expanded manufacturing facilities of the firm's Potentiometer Division. Completion is slated for April.

► Inland Automatic, Inc., 1108 Jackson St., Omaha, has expanded facilities for supplying plant and parts manufacturers with any shape or size (up to 1.5-in. diameter) automatic screw machine precision parts of titanium and other difficult-to-machine materials.

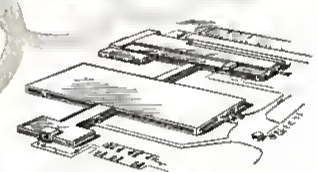
► Huck Manufacturing Co., Detroit, has acquired an additional 14,000-sq.-ft. building to house expanded production and research facilities for the firm's conical Keystone lock blind rivets. Production of this item is approximately 10 million monthly.

► Testing, Inc., is a new facility organized to run qualifications and production tests of electrical and mechanical products for the government and industry. Address is 5051 W. Jefferson Blvd., Los Angeles 16.

► Mayfair Industries, Inc., Chicago, maker of aircraft precision parts, con-

NOW LINKED TOGETHER...

DAYSTROM INSTRUMENT and AMERICAN GYRO—a team of proven ability, know-how and experience for the solution of any electronic, gyroscopic, control and automation problems REGARDLESS of SCOPE or MAGNITUDE—from drawing board to volume production.



DAYSTROM INSTRUMENT — Archbald, Pa.

In a big modern plant of 350,000 square feet Daystrom Instrument is staffed and equipped to develop, design and manufacture precision electronic and mechanical instruments for the Armed Forces and industry. The very finest modern machinery and equipment is available at Daystrom for the manufacture, assembly and test of these products.

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AMERICAN GYRO — Santa Monica, Calif.

Products and facilities of American Gyro Div. of Daystrom Pacific Corp. perfectly complement the products and facilities of Daystrom Instrument. American Gyro components and control systems are outstanding in a field demanding precision, accuracy, and ruggedness. Daystrom Instrument is proud to welcome this new member to the family of Daystrom Incorporated.

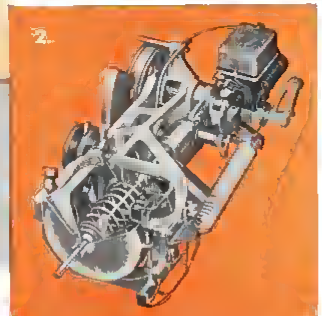
DAYSTROM INSTRUMENT, Archbald, Pa.

Advance

Gear Assemblies do more jobs better

Precision is the watchword in aircraft engineering and it is the major factor of every ADVANCE Gear Assembly. No matter what the specifications may call for, ADVANCE is qualified to meet them with precision gear assemblies that give perfect performance under the toughest conditions. ADVANCE engineers and craftsmen combine many years of experience with the most modern equipment to produce gear assemblies that will meet your special requirements. Illustrated below are a few of the many difficult assignments that we have completed for the aircraft industry.







1. An integral part of the mechanism of a 40 HP turbine driven unit manufactured by Marquardt Aircraft Company.

2. This elevator trim and force producer assembly is part of Northrop Aircraft Company's Scorpion F-89-D.

3. Hiller Helicopters also use Advance facilities to produce such assemblies as this Tailboom Gear Box.

Call or write us for further information.

Advance Gear & Machine Corp.

5851 Holmes Ave., Los Angeles 1, Calif., JE 8103

nectors and forgings in stainless steel and titanium, has appointed George E. Harris & Co., Inc. its sales representative. Main Harris office is at 1734 North Hillside, Wichita, Kan., with other offices in St. Louis, Fort Worth, Dallas and Cedar Rapids.

▶ **Shell Castings, Inc.**, is name of a newly formed group of Eastern and Midwestern foundries who are pooling their efforts in making shell molded castings in magnesium, aluminum, copper, bronzes, brasses, cast iron and steel alloys. For further data, write Shell Castings, Inc., P. O. Box 782, Erie, Pa.

▶ **Dallas Aero Engine Service, Tex.**, has been named the first authorized company in the U. S. to overhaul de Havilland Gipsy Queen Mk. 2 piston engines used on DH Dove twin engine light transport and business plane.

▶ **Certificates of management excellence** for 1954 have been granted five aviation manufacturing companies and one airline by the American Institute of Management. Named among the 379 U. S. and Canadian firms given awards: Douglas Aircraft Co., Santa Monica, Calif.; Grumman Aircraft Engineering, Bethpage, N. Y.; Lockheed Aircraft Corp., Burbank, Calif.; North American Aviation, Inc., Los Angeles; United Aircraft Corp., E. Hartford, Conn.; and American Airlines, Inc., New York.



Plane Opener

Designed to cut a 3 ft.-square escape opening in the fuselage of a wrecked plane in about one-quarter minute, this 12-in. rescue saw will be provided at all large airports in Britain, under proposals of Ministry of Transport and Civil Aviation. Here, a government official tries out the 19 lb. saw during a recent demonstration. It took a fireman, using an axe, more than one minute to hack a smaller opening in a comparative test. Saw is produced by Black & Decker, Ltd., Harmondsworth, Middlesex.



...this is the NAVY'S new T-34B

On June 17, 1954, the United States Navy announced the selection of Beechcraft's T-34 military plane as the Navy's new primary trainer.

On December 17, 1954, *just six months later*, the first U. S. Navy T-34B was delivered *on schedule*. Others will follow from the Beechcraft production lines for use by the Naval Air Training Command.

By use of the new T-34B, the U. S. Navy expects to make savings of millions of dollars in the over-all cost of its training program. The unit cost of the plane is low, and the per hour cost of flying is a fraction of the present cost of using heavier planes.

The T-34B is rugged, safe, and thoroughly dependable. It is the world's most economical military trainer.

The Beechcraft T-34 is now in production for the U. S. Navy, U. S. Air Force, and the military services of Canada, Chile, Colombia, El Salvador, Japan.



Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Beech Builds: USAF T-34 • USNavy T-34 • USArmy L-23 • USAF C-45 • Model 35 Bonanza • Model 50 Twin Bonanza • Super 18 Executive Transport



1. **UNDERGROUND** storage holds Nike missiles loaded and ready for firing. Elevator brings birds to surface from the storage area.



2. **LAUNCHING TRACKS** extend to both sides of elevator, receive and position missiles.



3 **GOING UP** to battery position, Nike rides to Launching tracks. Bird is fired remotely.

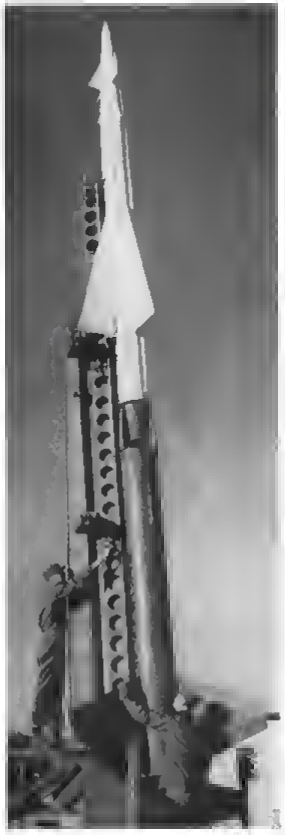
How Nike Keeps U.S. Sky Watch

First photos of the detailed handling of Army's Nike, supersonic anti-aircraft missile, point up some of the special features of this combat-ready system.

Battery storage facilities are underground in a large reinforced concrete vault, the slim birds are racked in a ready condition. An elevator at the center of the storage area lifts individual missiles to the surface for launching.

On the surface, the missiles are manhandled to battery positions on the long launching racks, from which they are raised and fired remotely.

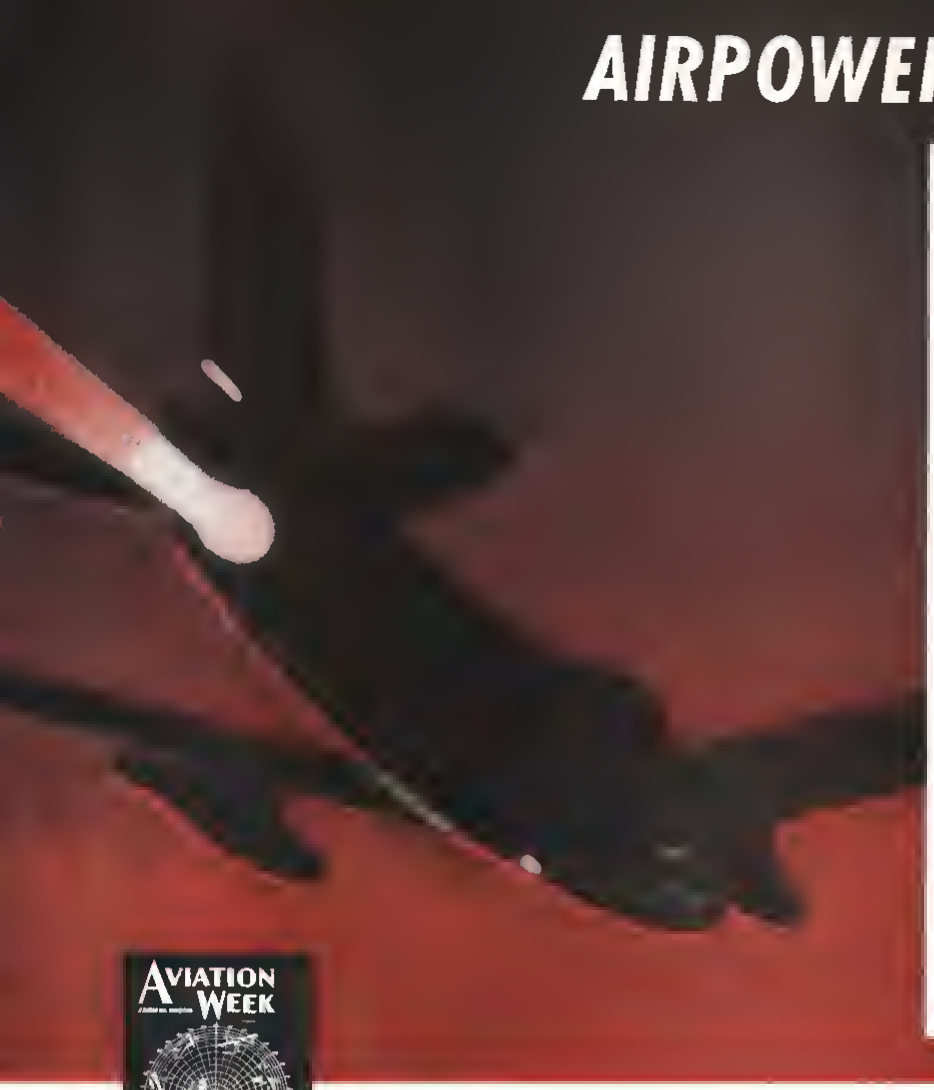
This battery is at Lorton, Va., one of the first Nike sites in the country, other batteries are similar in design and layout.



4 **FINAL CHECK** of elevated missile is made by Army technicians at launching rack.



AIRPOWER in the AGE OF PERIL



22nd Annual Aviation Week

MARCH 14, 1955

"Inventory of Airpower" Edition will cover vital aviation subjects on global scale

AVIATION WEEK'S 22nd ANNUAL "INVENTORY OF AIRPOWER" EDITION—"Airpower in the Age of Peril"—covering every phase of U.S. civil and military aviation, and providing the latest information on foreign airpower, will be published March 14, 1955. Featuring the complete story of the transition from the Korean crisis buildup to the solid industrial and airpower base necessary to meet the requirements of U.S. Policy over the long pull, this important issue will hold significant and lasting interest throughout the aviation world.

Aviation management men, engineers, military and government officials will read, refer to and depend upon "Airpower in the Age of Peril." Only in this edition will be found full information on fiscal 1956 federal aviation budgets, new procurement and financing regulations . . . ground rules that will guide Air Force and Navy policy in doing business with the aviation industry over the next two years, as well as latest reports from AVIATION WEEK correspondents in every part of the world on significant developments abroad.

Reference tables especially designed for "Airpower in the Age of Peril" will give new, revised specifications on U.S. and foreign aircraft, missiles, and engines. Special reports will cover the expansion of the guided missiles industry, the conversion of domestic and international airlines from piston to gas turbine powered equipment (including full statistical coverage of all U.S. and foreign airline operations), the expanding role of equipment and component manufacturers in the weapons system development and production cycle, and avionics in military and civil aviation. This storehouse of vitally needed aviation information will be used constantly wherever aviation business is transacted.

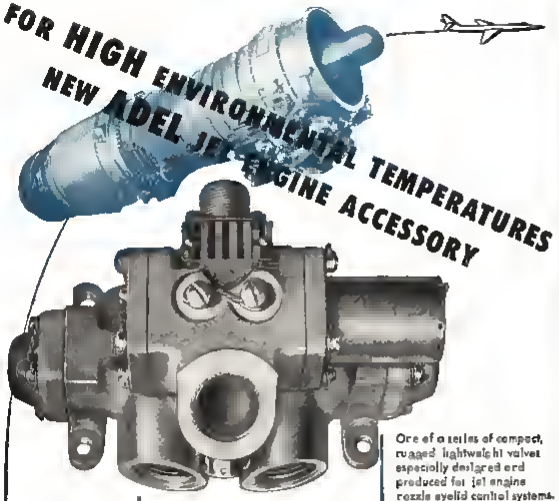
This extremely great usefulness to the aviation industry gives "Airpower in the Age of Peril" prime importance as an advertising medium. Aviation companies and their suppliers will find the long-lasting selling power of this significant AVIATION WEEK issue unmatched in aviation publishing today.

AVIATION WEEK

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FOR HIGH ENVIRONMENTAL TEMPERATURES
NEW ADEL JET ENGINE ACCESSORY



One of a series of compact, rugged lightweight valves especially designed and produced for jet engine nozzle eyelid control systems.

OPERATION

- **A** Spring Offset, Two Position, Solenoid Operated, Four Way Valve using engine oil to operate hydraulic cylinders
- **B** Solenoid energized, 3000 psi at inlet port produces outflow at cylinder 1—cylinder 2 open to return.
- **C** Solenoid de-energized, produces outflow at cylinder port 2, cylinder 1 open to return

CHARACTERISTICS

1. Ambient temperature range −65° to +350°F.
2. Operating pressure 3000 psi
3. Ports per AND10050 are available in 1/4", 5/16", 3/8", and 1/2" tube sizes.
4. No packing on sliding members.
5. Operating voltage 18-30 VDC.
6. Current required 1.0 amp. at 30 volts.
7. Continuous duty solenoid.
8. Pilot valve spring loaded against pressure to 4000 psi min.
9. Operating fluid MIL-L-7808
10. None interflow type valve.
11. Weight 1.75 lbs.

ADEL produces a complete line of Aircraft HYDRAULIC & PNEUMATIC CONTROL EQUIPMENT, HEATER, ANTI-ICING & FUEL SYSTEM EQUIPMENT, ENGINE ACCESSORIES AND LINE SUPPORTS.

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PRECISION PRODUCTS

DIVISION OF GENERAL METALS CORPORATION BURBANK CALIF HUNTINGTON W VA

CANADIAN REPRESENTATIVE RAILWAY & POWER ENGINEERING CORPORATION LIMITED

Navy Grants Lockheed $38.6 Million for WV-2

Lockheed Aircraft Corp., Burbank, Calif., has been awarded a $38,688,072 Navy contract for WV-2 radar picket versions of the Super Constellation.

Other recent Navy awards include:

Aerojet-General Corp., Azusa, Calif., booster units, $1,238,100.

Radio Corporation of America, Camden, N. J., Research and Development, $350,000.

Ultrasonic Corp., Cambridge, Mass., research and development, $108,451.

Curtiss-Wright Corp., Caldwell, N. J., research and development, $260,000.

Minneapolis-Honeywell Regulator Co., Minneapolis, research and development, $200,000.

Solar Aircraft Co., San Diego, compressor for gas turbine, $181,357.

General Electric Co., Schenectady, N. Y., motors, $298,920.

Westinghouse Electric Corp., Baltimore, turret systems, $18,631,124.

Hiller Helicopters, Palo Alto, Calif., H-23C helicopters, $2,271,500.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., structural tests and test equipment for F9F-8, $1,200,944.

McDonnell Aircraft Corp., St. Louis, kit parts for F2H-3 and F2H-4, $100,078.

Pratt & Whitney Division, United Aircraft Corp., East Hartford, Conn., modification of 124, $880,000.

Robertshaw-Fulton, Anaheim, Calif., oxygen regulators, $180,840.

Sylvania Electric Corp., Buffalo, N. Y., electronic components, $1,232,509.

Western Electric, New York, research and development, $450,000.

Hazeltine Electronics Corp., Little Neck, N. Y., communication equipment, $624,845; electronic equipment, $420,000.

Control Instrument Co., Brooklyn, N. Y., electronic equipment, $180,722.

Rockwood-Berg Corp., Chicago, radio transmitters, $170,134.

Goodyear Aircraft Corp., Akron, Ohio, engineering drawings, $271,287.

Vickers Electric Division, Vickers Inc., St. Louis, generators and related equipment, $163,425.

Magnavox Co., Ft. Wayne, Ind., research and development, $120,000.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

AMERICAN BOSCH ARMS CORP., Springfield, Mass., aircraft engine vibrators, 1,496 ea., $30,524.

ECLIPSE PIONEER DIV. Bendix Aviation Corp., Teterboro, N. J., field engineering services, 60 man-months, $61,560.

FEDERAL ELECTRIC CORP., Clifton, N. J., field engineering services, 60 man-months, $86,544.

HEAT & POWER CORP., Baltimore 2, services of technically trained personnel, $61,076.

HUGHES AIRCRAFT CO., Culver City, Calif., field engineering services, 48 man-months, $78,368.

FREWITT AIRCRAFT CO., Clifton Heights, Pa., perform analysis, etc., of modification to rotor blade, modify blades, reports, 10, $45,624.

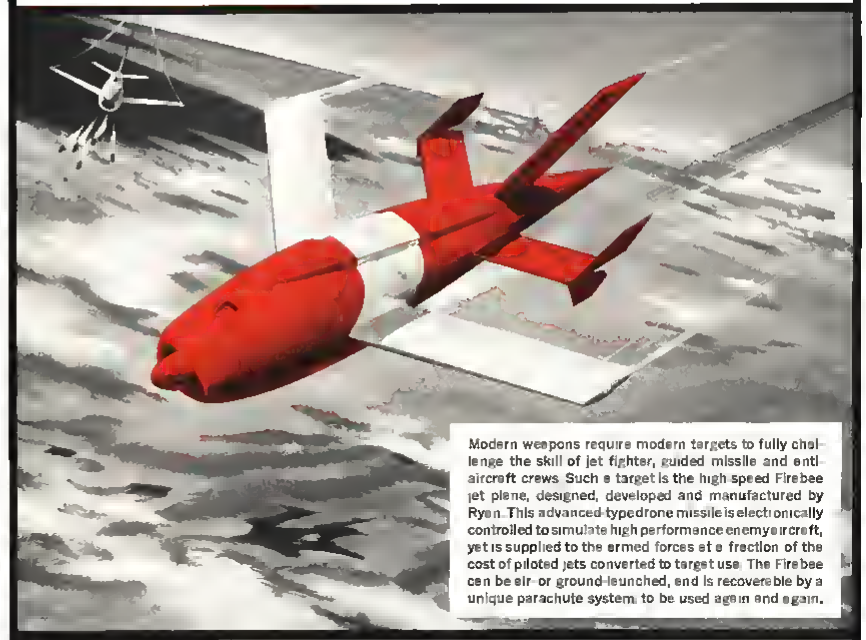
REYNOLDS METALS CORP., Richmond, 10, Va., acquisition and installation of capital equipment, $1,248,160.

RUFFEE, INC., Miami, Fla., conversion kits for bomb racks and rocket launchers, 696 ea., $54,852.

CHICAGO AERIAL SURVEY CO., Chicago 4, camera operating instructions, etc., 1 ea., $79,000.

ARTHUR D. LITTLE INC., conduct a research and development program on corrosion inhibitors, $34,483.

FIREBEE...TARGET FOR TODAY



Modern weapons require modern targets to fully challenge the skill of jet fighter, guided missile and anti-aircraft crews. Such a target is the high speed Firebee jet plane, designed, developed and manufactured by Ryan. This advanced type drone missile is electronically controlled to simulate high performance enemy aircraft, yet is supplied to the armed forces at a fraction of the cost of piloted jets converted to target use. The Firebee can be air or ground-launched, and is recoverable by a unique parachute system, to be used again and again.

Another Example of How

RYAN BUILDS BETTER

Already a seven league stride ahead of other target planes and towed targets, the Firebee drone missile has a large growth factor for future development. Its development demanded special ingenuity and the most advanced scientific knowledge. This achievement is just one of a long list of solid contributions in the company's 32 years of consistent growth in building the planes and aeronautical products which have helped develop America's air power.

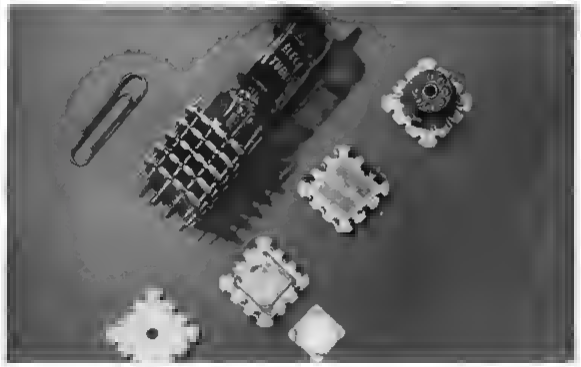
Specialized, yet versatile, Ryan is uniquely equipped for today's difficult research, engineering and production tasks. It excels in the ability to create and produce complex, high quality products at low cost—and deliver them on time.

Engineers looking for a challenging future will find outstanding opportunities at Ryan.

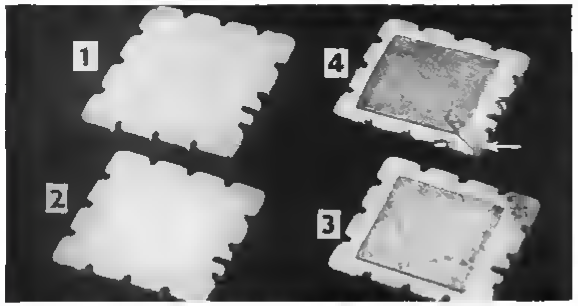
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METALLURGICAL ENGINEERING | WEAPONS SYSTEMS | ROCKET MOTORS & RAM JETS | AIRCRAFT EXHAUST & DUCTING SYSTEMS

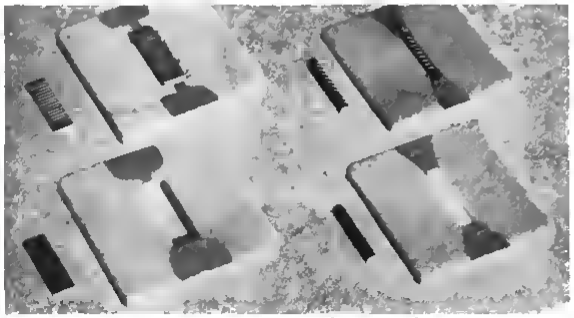
'Tinkertoy' Gets Boost From New Units



STACKED CERAMIC MODULES may see wider use as a result of new units below.



TAPE CAPACITOR is formed by coating wafer (1) with silver pattern (2). Metalized tape, coated with dielectric (3) then goes on. Conducting tape (arrow) provides connection (4)



PYROLITE RESISTORS, made by new process fit into grooves in ceramic wafers

• Improved capacitors and resistors now can be made automatically; this widens ceramic module potential.

New techniques for making more stable capacitors and higher-precision resistors for use in 'Project Tinkertoy' type stacked ceramic modules are expected to increase the number of potential uses for the modules. The modules, called "Modular Design for Electronics" (MDE), were developed by National Bureau of Standards.

The new resistors and capacitors, like the modules themselves, can be manufactured in fully automatic production lines (AVIATION WEEK Oct. 12, 1953, p. 73).

The newly developed MDE components include:

• **Tape capacitors,** whose construction resembles the earlier MDE tape resistors and which are applied to the ceramic wafer in similar fashion.

• **Pyrolytic carbon resistors,** made by a Bell Labs developed process, which are mounted in slots in the ceramic wafers.

• **Chip resistors,** employing resistive tape, for use in experimental or prototype quantity production.

Another independent program aimed at improved MDE components and construction is under way at ACF Industries' Electronics Division. This is headed by J. C. Reid and Robert Henry, who formerly directed the MDE program at NBS (AVIATION WEEK Nov. 29, 1954, p. 68).

▶ **Greater Stability**—The new tape capacitors reportedly provide considerably more stability under extreme temperature than did the early MDE units which were essentially ceramic capacitors. NBS reports that the capacitance of the new capacitors changes only 3% between 25C and 85C, 15% between −55C and 25C. They have been operated at temperatures as high as 125C, an NBS spokesman told AVIATION WEEK.

Shelf life aging also is good, NBS says. Capacitance changes during the first month after manufacture do not exceed 1%, NBS reports, and there is no change in dissipation factor, which averages 0.7% at 1 kc.

The new capacitors have been made in the range of 500 to 2,000 μμfd., and can be made down to around 10μμfd., a spokesman says. The older MDE capacitor covered the range of 7 to 10,000 μμfd.

▶ **How They're Made**—The new tape capacitors are made by spraying an asbestos tape with a conducting metalized film on both sides, then spraying one side with a high K titanate dielectric.

The thickness of the dielectric film, which determines the capacitance value, can be varied by the number of passes which the tape makes in front of the dielectric spray gun.

The dielectric-coated tape is cut into ¾ in. squares and placed, dielectric side down, atop a ceramic wafer on which a silver pattern has been deposited, dried, and fired. A narrow conducting strip, resembling a tape resistor but with a very high conductivity (0.04 ohm/in.), is laid down between the metalized top side of the tape and the edge of the wafer, where electrical connections are made during module assembly. (see middle photo facing page.) The entire assembly is then fired and cured.

Capacitors of higher values can be made by applying a number of layers of tape, one atop another, with appropriate connections to the edge of the wafer. Smaller values of capacitance can be obtained by reducing the area of the silver pattern printed on the ceramic wafer, or by increasing the thickness of the dielectric coating deposited on the tape.

The new-type capacitors make it possible to apply tape resistors to one side of a ceramic wafer, tape capacitors to the other, NBS says.

▶ **Semi-Precision Resistors**—The new Bell Labs pyrolytic carbon resistor can be manufactured in sizable quantities to a 2% tolerance, compared to 10% possible with the older MDE tape resistors. For this reason NBS adapted it to a specially designed ceramic wafer.

The new resistors, available in either flat or cylindrical shapes, and measuring approximately ¾ in. long by ¼ in. wide or ¼ in. in diameter, are inserted in a wafer having an appropriately shaped depression (bottom photo, facing page). The depression has printed conductors on each end to provide electrical connections to the resistors.

The pyrolytic resistors are made by decomposing methane gas at high temperature, which deposits pure carbon on miniature ceramic forms in accurately controllable thickness. The coated forms are then either grooved or spiraled mechanically to increase the electrical path length and to decrease path cross section.

The new resistors can be made in 10-ohm to ¼ megohm sizes, compared to a 10-ohm to 10 megohm range for the older tape resistors.

▶ **Chip Resistor**—For breadboard circuits and prototype module fabrication NBS has come up with what it calls a "chip resistor," consisting of a tape resistor mounted on a small ceramic chip which in turn can be soldered to a standard wafer.

Should it prove necessary to change the value of this resistor during experimentation, the chip resistor can be unsoldered easily and a new one substituted. NBS currently is developing a machine which will automatically turn out chip resistors at the rate of 1,000 per hour.

The new MDE components were developed by Dr. B. L. Davis and associates in the Bureau of Standards' process technology laboratory.



METALIZED TAPE for new capacitors is prepared by running it past spray gun (right), later spraying on a coat of dielectric. Tape is then ready for automatic cutting and attachment to ceramic wafers. This photograph shows laboratory setup.

1 + 1 / 2

Field Service Representatives

Stratos has immediate openings in its growing Field Service Organization for two qualified young men. After a familiarization program at the plant, assignments to interesting field positions will be made.

The positions are responsible ones, requiring high caliber individuals who can represent the company at customers' plants and work with customers' engineering and field personnel on matters pertaining to the installation and servicing of Stratos equipment. An engineering background is essential and a degree is desirable. Familiarity with aircraft and test house experience is required. A knowledge of pneumatic high speed rotating equipment will be helpful.

Stratos designs and manufactures precision aircraft equipment including cabin pressurization and air-conditioning systems, air turbine drives, pneumatic controls and valves and other accessory equipment.

Send resume to:

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"ONE MILLION MILES—SAFELY with AIRWORK OVERHAULED ENGINES"

says International Harvester's Chief Pilots W. R. Dotter and Raoul Castro



The IH fleet averages nearly 200,000 miles a year on Airwork engines—and stays 100% available for service.

Airwork CORPORATION
Millville, New Jersey
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says CLEM HENRY,
Pilot, W. C. Langley & Company

"My absolute confidence in Airwork Overhauled engines lets me keep my mind 100% on the job of flying . . . my boss shares my confidence . . . we've used Airwork since 1948 for our Twin Beech engine overhauls.

Airwork CORPORATION
Millville, New Jersey
NEW YORK MIAMI WASHINGTON

Lear Buys Servo Company's Designs

Lear, Inc., has purchased design and manufacturing rights to all hydraulic and pneumatic servo systems and components of Auto-Control Laboratories, Alhambra, Calif. This is one of several recently announced expansions and changes in the avionics industry.

ACL-developed products, which Lear expects to manufacture in the near future, include high performance servo valves, torque motors, and servos. The top technical staff of ACL will join the Lear organization.

Other avionics industry news includes:

• **Aeronca Manufacturing Corp.**, Middletown, Ohio, has purchased Industrial Research Labs, Baltimore, which is engaged in basic and applied electromechanical research. IRL, which becomes a division of Aeronca, will continue operations at Baltimore under the same management.

• **Collins Radio's Canadian subsidiary** has announced plans to build manufacturing facilities at Toronto for production of both commercial and military equipment.

• **Canadian Marconi** recently opened its new research laboratories in Montreal. During opening ceremonies, company displayed its new lightweight ADF, called first of its kind developed and produced by a Canadian firm.

• **Hetherington, Inc.**, Sharon Hill, Pa., manufacturer of precision switches, has formed new division to manufacture variety of coils.

• **Elgin-Neomatic, Inc.**, is new name for Elgin National Watch Co.'s new West Coast subsidiary, formerly named Neomatic, Inc.

• **General Cybernetics Corp.**, Beverly Hills, Calif., is the name of newly formed affiliate of Angle Computer Co., Inc., Glendale, Calif. New company, which will design and manufacture automatic control systems, computers, and associated components, is built around group formerly known as General Cybernetics Associates.

Advances Reported In Miniaturization

A tiny gyroscope motor, smaller in diameter than a human thumbnail, is one of several recently announced miniature devices which will enable engineers to reduce the size and weight of avionic equipment.

The tiny synchronous type gyro motor, developed by Westinghouse Electric Corp., incorporates an "inside out" construction with a wound inside stator and outside rotor which forms the gyro's inertia wheel. The motor operates from two phase, 400 cps power, rotates at 8,000 rpm.



TINY GYRO MOTOR is built 'inside-out.

Other new miniature devices include:

• **High temperature thermistor**, Type L-118, measuring only 0.018 in. in dia., reportedly is extremely stable at 300C, and is usable up to 400C. Thermal time constant reportedly is only one second in still air, faster in liquids.



THERMISTOR diameter is only 0.018 in.

One milliwatt of power will heat the thermistor 10C above ambient temperature in still air. Manufacturer: Thermistor Corp. of America, Metuchen, N. J.

• **Sub-min relay**, Type CPL, hermetically sealed, measures approximately ¾ x ⅝ x 1⅜ in., weighs 1 oz. Unit is available in SPDT or DPDT models, with contacts rated 5 amp. resistive at 28 v. d.c. or 115 v. a.c., or 3 amp. inductive. Relay operating temperature range is — 55 to 125C, and unit reportedly withstands 15G through 500 cps., plus 50G shock. Manufacturer: Pacific Relays, Inc., 6819 Melrose Ave., Los Angeles 38.

• **Pressure switch** weighing only 4 oz. can be provided for operation in the range of 5 to 12,000 psi, at temperatures of — 65 to 275F. Tolerance of actuation setting varies from 3½% at 3,000 psi, to 10% at 100 psi. Pressure switches are available in variety of contact arrangements: SPST, SPDT, 2PST, 2PDT, normally open or closed. Contacts can handle 17 amp. inductive at 24 v. d.c., 15 amp. at 115 v. a.c., or 7½ amp. at 230 v. a.c. Manufacturer: Leach Relay Co., 5915 Avalon Blvd., Los Angeles 3.

• **Telephone-type relay**, Series SQ, of



fers maximum sensitivity of 15 mw per pole in the DPDT configuration, and is available in up to 6PDT configurations. Unit reportedly withstands 10G vibration from 10 to 500 cps, or up to 30G if sensitivity is reduced to 40 mw per pole. No organic insulation is used. Contact ratings of 1 to 5 amp are available. Relay can be obtained in sealed container, measuring 1x1x2 in., with either solder-terminal or plug-in connections. Manufacturer: Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif.

• **Sub-min bandpass filters,** occupying only 0.55 cu. in., are designed to meet MIL specs with a 6% bandwidth at 3 db, 40 db/octave. Units are hermetically sealed. Manufacturer is Communications Accessories Co., Hickman Mills, Mo.

FILTER CENTER

► **Soviet Electronics Lags**—The U.S. produced nearly three times as many TV sets in the month of September as the Soviets did in the entire year of 1954, an indication of possible Red weakness in the strategically important field of electronics production capacity. According to United Press dispatches quoting Moscow radio, the Reds produced only 325,000 TV sets in 1954, hope to produce 700,000 this year.

► **Electronics Grows in L.A.**—At last count, there were 491 electronics firms operating in the metropolitan Los Angeles area, according to a recent report by the city's Chamber of Commerce. The report speaks of "encouraging gains" in the growth of companies active in the component parts field.

► **Piedmont First With New VHFs**—Piedmont Airlines is the first local service carrier to equip its fleet with new 360-channel VHF communications receivers (with 50-kc. channel spacing), according to Bendix Radio, which supplied the RA-18C sets to the carrier.

► **Cheaper Silicon Transistors**—Texas Instruments, Inc., has cut prices on its five types of high temperature silicon transistors by 25% and on two types of silicon junction diodes by 30%. Price reduction is attributed to improved manufacturing techniques.

► **New Canadian Nav Computers**—Royal Canadian Air Force headquarters at Ottawa has announced two new navigation computers, both reportedly independent of radio transmissions and thus jam-proof. One, a rho theta computer, gives pilot steering directions as well as distance to destination. The other computer, based on the same general principles, has push buttons which enable pilot to select any one of several destinations. When pushed, they give homing indication to that destination. RCAF has released no details on the principles of operation.

► **M-H Heads West**—Minneapolis-Honeywell's Aeronautical Division is establishing a new engineering center in West Los Angeles "to fulfill expanded military development and engineering commitments in the field of guided missiles and aircraft control systems," according to the division's v.p., S. F. Keating. John Sigford, who heads another M-H satellite engineering group in Dallas (AVIATION WEEK Jan. 3, p. 62), will assume additional duties of manager of the L.A. operation.

► **Radar for Weather Research**—An AN/CPS-9 radar (X-band) has been installed atop Great Blue Hill in Milton, Mass., for meteorological research into the use of radar to determine the size, intensity, direction and speed of squalls, thunderstorms and hurricanes. Harvard University scientists will gather the information under contract with the AF Cambridge Research Center. —PK

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SINCE 1907, FABRICATORS OF METAL AIRCRAFT ASSEMBLIES AND ARCHITECTURAL PRODUCTS

Rugged Transducers Take High Heats

A high temperature, linear motion transducer, designed for operation at temperatures of −160F to 1,300F, is one of several recently announced transducers suitable for avionic use.

The linear transducer is available with linear stroke ranges of 1 to 32 in., operating sensitivities to 5 v/in., linearities to 0.1%, and resolution of 1×10^{-3} in. Output signals are generated



CRESCENT transducer goes to 1,300F.

by a special configuration of the variable permeance bridge. Manufacturer is Crescent Engineering & Research Co., 14828 Arrow Highway, Baldwin Park, Calif.

Other new transducers include:

- **High-temperature accelerometer**, capable of operating at −65F to 550F, is available in ranges of 1G to 50G, with damping ratio of 0.5 to 0.7. Potentiometer output with resistances of 300 to 20,000 ohms can be provided. Instrument accuracy is reportedly 0.5% to 2%, depending upon range. Pacific Scientific Co., 1430 Grande Vista Ave., Los Angeles 23, Calif.
- **Differential pressure sensor**, Model 508, available in 17 standard pressure ranges up to 30 psi, weighs 7 oz, comes with pot pick-off in resistances of 1,000 to 10,000 ohms, with resolution of 0.25% to 0.5%. Unit measures 2¼ in. dia x 2¼ in. Manufacturer says unit is designed for rugged missile use. Manufacturer is Bourns Laboratories, 6135 Magnolia Ave., Riverside, Calif.
- **Altitude and airspeed sensors**, designed to MIL-F-5272, operate at temperatures up to 160C. Altitude transducer, covering range to 90,000 ft., reportedly is linear to within 0.5% to 1% (with either altitude or pressure). Bulletin 954-5 gives details.

Manufacturer has also redesigned line of linear accelerometers to meet MIL specs. Units are available in ranges up to 50G, with natural frequencies up to 95 cps, and fluid damping of 0.65. Units come in 1.25 and 1.75 in. dia., and weigh 1-1¼ lb. Bulletin 954-7 gives full specs. Manufacturer Rahm Instruments Inc., 12 West Broadway, New York 7, N. Y.



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At the Reliance Electric & Engineering Co., Cleveland, Ohio, the use of photographic templates and Kodagraph Autopositive Paper has helped to lower drafting-room costs by at least 30%, besides assuring highly legible shop prints day in and day out.

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INERTING SYSTEM using engine exhaust gas would weigh about 35 lb. on the DC-7

How to Inert Aircraft Fuel Tanks

Inerting aircraft fuel tanks to preclude the possibility of explosive mixtures ever being present in the tank or being exhausted through tank vents is not only feasible and desirable, but it can be accomplished at nominal cost and weight penalty, according to Dr. Howard W. Naulty, section head of the Industrial Division, Cornell Aeronautical Laboratory.

At the recent meeting of the Air Transport Section of the National Safety Council in Chicago Dr. Naulty presented his views, in a paper entitled "Inerting of Fuel Containers—Handling of Volatile Materials." In it he examines the practicability of inerting aircraft fuel tanks by using exhaust gases from the plane's engines.

▶**Practical and Economical**—To back up his premise that such an installation is practical and financially attractive, Dr. Naulty says that a fuel tank inerting system installed on a DC-7, for instance, would weigh approximately 35 lb.

To justify such a weight increase, the author uses this reasoning: "At a profit rate of $1,000 per pound per year, it would cost an airline $35,000 to add this safety feature to a DC-7. If the plane costs $1.7-million, each total-loss fire prevented by the inert gas system would pay for the installation's weight penalty revenue loss for 50 aircraft years.

Naulty points out that these figures are for actual cost of the airframe and do not include revenue loss for the time during which the plane is being replaced, possible damage suits for personal injury, property damage, etc. He estimates that actual total loss would be several times the value of 50 aircraft years.

▶**Major Advantages**—Here are the major advantages of an inert gas system, as Naulty sees them:

• **In flight,** the fuel tanks would be protected from possible lightning or static discharge hazards. With shrouded fuel tanks, in which the tanks are surrounded with inert gas, leaking fuel would be trapped in an inert atmosphere, preventing vapor from permeating the entire aircraft.

• **On the ground,** the fuel tanks would remain inerted for an undetermined length of time. The fuel tank vapor oxygen content increase in an actual military installation in a PB4Y-2 was 1% over a period of 30 days. With the inert gas system, there would be less breathing of the fuel tanks. This fact would mean safer hangar conditions. There would be less probability of spark-ignited fires such as those caused by breaking electric light bulbs, etc., during maintenance operations. The fire or explosion hazards of refueling an inerted fuel tank would be at a minimum. The introduction of fuel into a tank displaces a portion of the vapor above the fuel, causing an efflux of an air-fuel vapor mixture from the tank vent and the open filler neck. This vapor usually is too rich to burn in the filler neck but it is diluted by ambient air quite rapidly, creating a real fire hazard.

▶**Area of Hazard**—The area of fire hazard around an aircraft fuel tank during refueling operations is shown in the table below, left.

These data, which were published by Flight Safety Foundation as a condensation of a technical paper of the British Department of Scientific and Industrial Research and Fire Offices' Committee, are for the worst possible conditions. Any source of ignition in these areas would cause a flash, perhaps an explosion.

However, if the tank contains inert gas, the effluent air-fuel vapors displaced by the refueling process would be inert and it would not be possible for flame to flash back through the filler neck. Even if fuel spilled on the wing became ignited the fire would not enter the tanks and the flame on the wing could be controlled by a hand fire extinguisher without fear of the entire wing blowing up.

▶**Simple System**—Considerable research has been accomplished and many reports are available concerning the development of inert gas systems for aircraft, Dr. Naulty says.

A simple, lightweight inert gas installation could be made on all our existing commercial aircraft, which would offer fuel tank protection in flight and on the ground as well, according to Naulty.

Any closed tank must be vented to atmosphere. Without such a vent, either the fluid could not be withdrawn from the tank or the tank would collapse. The vent also allows pressure within the tanks to equalize with ambient atmospheric pressure as the plane changes altitude.

Naulty suggests that the simplest inert gas system would consist of an inert gas source connected to the tank vent, thus allowing the inert gas, instead of air, to be siphoned into the fuel tank.

With such a system when the tank breathes for any reason whatsoever, it breathes inert gas. When all the fuel has been removed the tank contains nothing but inert gas. When the tank is refilled the incoming fuel forces a portion of the inert gas out of the tank but the remaining space above the fuel is always inert.

Engine exhaust gases are an excellent source of inert gas. An engine has an exhaust stack with exhaust gas flowing to the atmosphere. A line could be provided to bring gas from the exhaust to a heat exchanger which is provided with a means of draining liquid condensate to the atmosphere. The inert gas is cooled in the heat exchanger from 1,200 to 1,400F to a temperature of 70F. This cooling condenses out most of the moisture and corrosive elements in the exhaust gas. The vent line from the fuel tank is connected to the heat exchanger gas outlet so that when the tank inhales it draws cooled, dried exhaust gas into it. If the engine is adjusted properly the O_2 content of the exhaust gas should be approximately ½%—well below the safe limit, which is 10%.

▶**Altitude Effect**—As an aircraft climbs, air and vaporized fuel will be expelled from the tanks. It is true that some fuel will be consumed during the climb but the expansion of the air-fuel vapor mixture due to barometric pressure change usually will be greater than the volume of the fuel consumed.

In level flight the consumption of fuel will demand a volume of inert gas equal to the volume of and at the same rate as, the fuel consumed by the engines.

In a dive, the demand for inert gas will be for a volume sufficient to compensate for the increase in barometric pressure. In the case of military aircraft, where long fast dives are a standard maneuver, the rate of demand for inert gas during such dives presents a real problem. However, in commercial aviation, where rates of descent rarely exceed 1,000 ft. per minute, the demand rate will be approximately equal to or only slightly greater than the level flight demand rate.

This demand rate influences the size and weight of the inerting equipment. Large flow rates require a corresponding increase in the size of piping, valves, and associated equipment such as the exhaust gas heat exchanger.

▶**Russians Used It**—According to the British magazine, Flight, the Russian Lagg III in 1944 used a siphon inerting system without any means of preventing liquid fuel from flowing into the exhaust outlet.

Since such an eventuality would cause considerable torching at the exhaust outlet it would seem advisable to install a check valve in the inert gas tank vent line. The introduction of this check valve into the basic siphon inerting system will prevent the escape of expanding air-fuel vapor in the tank. If the aircraft climbs to altitude, it then becomes necessary to add a pressure relief valve between the check valve and the fuel tank to permit the expanding gases to escape.

▶**PB4Y Installation**—With the basic inert gas installation, it was possible to reduce the oxygen content of the fuel tanks in a PB4Y-2 to ¼% at the end of a flight and to maintain inerted tanks for a long time afterward. At the end of 30 days the oxygen content of these tanks was 1¼%, well below the previously established 10% oxygen limit. After refueling, the oxygen content of the small air space above the fuel was 2%.

Since the PB4Y-2 was a combat aircraft, and since combat damage might conceivably close off the inert gas line, causing a serious negative pressure in the fuel tanks, a vacuum breaker valve set at −2 in. of water was added to the system. Thus, if the pressure differential between the internal and external tank pressures reached 2 in. of water, the vacuum relief valve would open and allow air to enter the tanks. This valve would not be required on a non-combat transport aircraft.

With the siphon inert gas installa

WIND SPEED (mph.)	RATE OF FILLING (gpm.)						
	20	40	60	80	100	120	150
0-3	99	35	4	47	59	73	84
5	11	1	2	3	31	45	40
8	—	11	14		70	94	25
10	4 7	8	10	12	14	16	18
15	3 6	6	7	9	10	12	13
20	1 10	4 7	6	8	8	10	11

Radius of Danger (ft.)

TABLE SHOWS RADIUS OF DANGER around a fueling point under conditions of strong atmospheric inversion. Figures are based on a British study.



tion, inert gas will flow through the system only when

- Fuel is drawn from the tanks as the engines consume it
- The aircraft descends to an atmosphere of greater barometric pressure

These two conditions represent the minimal flow conditions Therefore the siphon inert gas system requires the least possible volume of inert gas for fuel tank fire protection, and size and weight of the system will also be at a minimum, Naulty says

▶**How About Corrosion?**—With the inert gas system, after 52 months of constant exposure to the inert gas, the metal inside the wings of the PB4Y-2 airplane showed less corrosive effects than the inside of the fuselage from normal weathering for the same period

Recent development of a catalytic exhaust gas cleaner shows considerable promise as a means of converting engine exhaust to a non-toxic, non-corrosive gas This device is now being installed on fork lift trucks and other gasoline engines used indoors Another type of cleaner unit used on diesel engine exhausts should work equally well on JP-4 fuel exhaust

▶**For Jets, Too**—The basic inert gas system can be equally effective and used without change in jet-powered aircraft, Dr Naulty states, except for the source of the inert gas. The jet engine itself could supply this, in spite of jet engine manufacturers' reluctance to have their powerplants "bled to death

An inert gas system's demands on a jet engine would have practically no effect on its performance, according to Naulty. During climb, when much power is required of the powerplants, they would not have to feed the inert gas system, because lowering atmosphere pressure, as the plane climbs, compensates for drop in tank level as engines burn fuel up

During level flight, when the demand for inert gas would be relatively small, the engine would be at cruise power where it is not developing full thrust, so a small gas bleed would not harm its performance, Naulty states

And during descent, when the demand for inert gas is at maximum because of increasing atmospheric pressure, the engines would be operating well below their cruise thrust so the inert gas bleed would have no deleterious effect on their power output

Dr Naulty does not say what happens to engine performance during takeoff when power requirements, and therefore fuel consumption are at their highest This condition presumably would place quite high demands on the inert gas system, since fuel level in the tanks would be dropping rapidly, requiring a relatively high influx of inert gas

"If engine manufacturers could be assured of an inerting system which would not reduce the performance of their engines, they would agree to and have little difficulty in developing a source of inert gas from the jet engine The basic siphon inerting system would fit those conditions and therefore would be applicable to both reciprocating and turbine-powered aircraft," Dr Naulty says.

▶**Gasoline Hazards**—Gasoline is hazardous within the limits of 14F to −42F at sea level and this hazard progresses with altitude increase until at 60,000 ft the limits become approximately −76F and −94F. With the exception of polar operations the average fuel temperature is considerably above the combustible range while the aircraft is hangared or standing on the ground.

However, these data can be very misleading, Naulty points out Consider the case of the aircraft that has just landed and is standing on the ramp being refueled The air temperature on the ground is 30F to 40F or even higher. At these temperatures, the fuel vapor-air mixture in the tanks is too rich to burn But, this airplane has just descended from altitude and, in doing so, the fuel tanks "inhaled" a large quantity of air to compensate for the increases in the barometric pressure Most of the air that entered the tanks during the descent would have been cold enough to render the vapor in the fuel tanks combustible.

The fact that the aircraft is being refueled adds to the hazard because the effluent fuel vapor air mixture that is forced from the tanks by the incoming fuel is in the combustible range which would permit a fire to flash back through the opening into the tanks and an explosion would result

Thus, what might appear to be a relatively safe fuel tank could actually be quite a hazard Further it could take several hours for the fuel and the vapor-air mixture above it to warm to the outside air temperature where it would be in the "too rich to burn" zone. Thus, the fuel tanks of an "en route" aircraft might well remain in the danger zone throughout the entire trip and possibly for several hours afterward even with a tropical or semi tropical flight termination

▶**Kerosene Hazards**—The advent of turbine powered aircraft has introduced another factor Gas turbines have used anything from 130 octane to kerosene

Limits of the flammability zone for kerosene are theoretically 100F and 194F at sea level and, at 60-000 ft altitude the flammable zone falls between 35F and 45F

While these data would indicate that kerosene and similar low-volatility fuels should be safe from flash fires or



This Scale Measures Weight and CG

Weight or center of gravity shifts due to fuel consumption can be accurately measured on this novel scale installed at Chance Vought Aircraft, Inc., Dallas. The $75,000 installation can take planes or missiles weighing up to 90,000 lb. It allows engineers to get accurate data before the aircraft fly. Two 30-ton Howe truck scales linked together form the crossbar of the T-setup. The crossbar is a floating 10x34-ft. concrete slab. Main landing gear rests on this section Nose gear is placed on the vertical part of the T, which comprises a five-part 15 ton hydraulic Rotary Lift Co. installation, which can tilt the nose up and down Near the pits housing the scales is a smaller pit that contains measuring instruments and has room for two technicians Scales are stated to be accurate to one-tenth of one percent and can usually do a weighing job in 15 minutes that ordinarily takes one hour By manipulating the nose hydraulic lift, engineers can check CG shifts as fuel is used.

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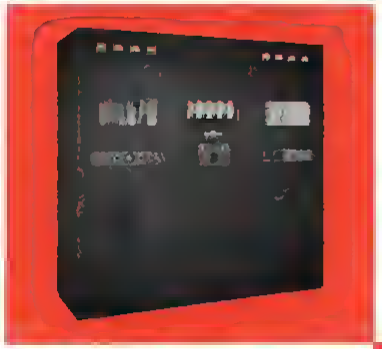
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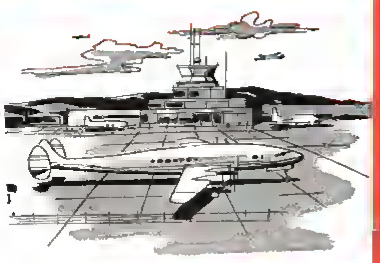
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explosion during normal operating conditions, such a safe condition does not exist, Naulty says. For example, it is quite common to find fuel temperatures as high as 175F when the aircraft is standing in bright sunlight.

With gasoline, the vapor in these tanks would be too rich to burn, but with kerosene the vapor would be well within the combustible range and would remain there for some time after the aircraft leaves the ground.

The Royal Aircraft Establishment in England and the Shell Oil Co. in this country conducted separate investigations of the behavior of low vapor pressure fuels.

The conclusions that were reached by these two organizations were almost identical, according to Naulty.

To quote from the Shell report: "... low volatility fuels such as discussed here will form explosive mixtures with air at most altitudes. To eliminate this hazard, blanketing of the fuel tank with an inert gas appears to be the most promising method. Cooling of the fuel to lower the prevailing vapor pressure or forced ventilation of the tank atmosphere on the lean side of the explosive range, are not adequate to prevent explosions.

"Tests in a closed vessel have shown that, if the fuel is agitated so that a spray or mist is formed, explosions may occur at temperatures as low as —45F with a low volatility fuel, approximately 145F below the flash point. ... Agitation and splashing are always prevalent when filling a fuel tank. Under such conditions, blanketing of the tank vapor space with an inert gas appears to be the only positive method of eliminating the hazard."

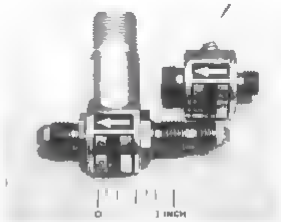
Booster Overcomes Line Losses in FJ-4

A new high-suction fuel booster pump, designed for North American's speedy FJ-4 fighter, has been put into production by Pesco Products Div., Borg Warner Corp.

The company says it is the first centrifugal impeller-type pump for a line mounted fuel transfer application with sufficient suction lift to overcome inlet line losses.

The new fuselage-mounted unit, called Model 122913-010, overcomes losses in the FJ-4's long inlet lines and delivers a full flow of JP-4 fuel to the engine up to 45,000 ft., according to Pesco.

Pump is instantly repriming should it become unprimed during maneuvers, is able to pump boiling fuel and can run dry for 15 hours and reprime itself, says the maker. It weighs 7.4 lb., measures 11x5x5 in., is designed for a 1,200 hr. overhaul cycle.



THESE VALVES are half the size of conventional units, weigh 2¾ and 1¾ oz.

Coaxial Design Cuts Shutoff Valve Size

A new, solenoid operated shutoff valve, about half the size and weight of more conventional types, is being made and marketed by Aero Supply Manufacturing Co., Inc., Corry, Pa., under an agreement with Eckel Valve Co., developers of the unit.

Aero Supply says that nearly 20,000 of the valves are now in aircraft services, in such applications as pilot, bleed or vent valves in cabin air systems. Units come in many variations of sizes and materials.

The coaxial valve uses a new coil arrangement, designed by Eckel, to obtain its small size. The two units shown weigh 1⅞ oz. and 2¾ oz. respectively, have an equivalent flow orifice of ⅜ in. diameter, will open against 200 psi. at 17 v. d.c. with a temperature of 500F. They are furnished either normally open or normally closed. Leakage is zero, the manufacturer reports.

OFF THE LINE

Conversion of Vickers Vikings from passenger to cargo or cargo-plus passenger aircraft is accomplished by enlarging the door to 54-ft. square opening, installing a strengthened ½ in. plywood floor and generally lightening the aircraft by removing duplicate equipment. System was developed by Eagle Aircraft Services, Ltd., Surrey, England. A total of five Vikings have been or will be converted for the Arab Legion Air Force, Airwork, Ltd., and Svenska Aero.

Contract for over $1.3 million has been received by Thomas A. Edison, Inc.'s Instrument Division from Convair for fire detection equipment to be installed on all Air Force B-36 bombers. Convair will install the new, continuous-cable fire detection system at its Fort Worth plant. The system is also installed in Convair's supersonic, delta wing interceptor, the F-102.

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DOW CORNING CORPORATION

Silicone News

FOR DESIGN ENGINEERS



Low Density Silicone Foams Are Nonflammable; Hove Heot Distortion Temp Above 700 F

There's a solution now to problems involving nonflammable low density foamed structures with good thermal and electrical insulating properties buoyancy after long exposure to water and superior compressive strength at temperatures in the range of 500 to 700 F What's more, such structures are easily made by foaming completely formulated silicone powders in place or sandwiched between metal sheets or silicone glass laminates, by thermoplastic shaping before curing or by cutting from cast sheets or blocks

Identified as Dow Corning R 7001, R 7002 and R-7003, these non-toxic silicone powders produce foams with a uniform, multipore structure that is predominately spherical and unicellular Densities in the range of 10 to 18 pounds per cubic foot can be produced Here are typical properties of open pan foams

TABLE I

	R-7001	R-7002	R-7003
Expansion Temp, F	300	370	300
Density, lb/cu ft	13	14	16
Cell Structure, diameter, in	<0.08	<0.08	<0.08
Compressive Strength, psi at 77 F	100	300	320
at 77 F 250 hr at 500 F	190	100	210
at 500 F 1/2 hr at 500 F	5	28	70
at 500 F 250 hr at 500 F	20	43	80
Weight Loss, % during expansion	12	13	10
1000 hr at 500 F	3.5	3.6	2.8
1000 hr at 572 F	5.0	4.2	4.1
72 hr at 700 F	8.5	6.2	5.2
Water Absorption, % 24 hr immersion	3.2	2.2	3.1
Heat Distortion Temp, F	>700	>700	>700
Flame Resistance	Do Not Burn		
Dielectric Constant 10³ cycles	1.23	1.25	1.26
Power Factor 10³ cycles	0.0004	0.00192	0.00188
Thermal Conductivity BTU/hr/sq ft/°F/in Ambients	0.3	0.3	0.3

5 MIL SILASTIC DIAPHRAGMS SENSITIVE FROM -22 to 230 F

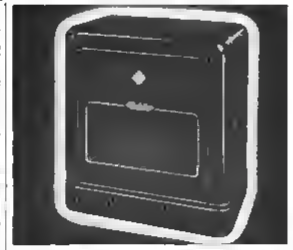
Wanted—A diaphragm for aircraft use that can be produced in commercial quantities to register, in thousandths of an inch, changes in air pressure at temperatures from —22 to 230 F, must resist moisture, withstand vibration and shock. That's a problem that Westinghouse materials engineers couldn't solve with such conventional materials as thin metals, natural or butyl rubber So they met all requirements by developing commercial techniques for molding Silastic membranes, as little as 5 mils in thickness to aluminum discs The process requires utmost cleanliness and precision including extremely accurate control of processing time, temperature and curing schedules. *No. 20*

Among many potential applications foamed structures with these properties and handling characteristics may be useful as core materials for propellers and airfoils and in the form of sandwich structures, as radomes and fire walls in aircraft. They hold promise as thermal insulation for range oven doors and portable ovens

Low density combined with low water absorption and nonflammability suggest a possible use as buoyant components in boats and ships Heat stability combined with good dielectric properties suggests application as electrical insulating materials at high temperatures or where conventional insulation is hard to apply. *No. 19*

New 1955 Reference Guide to Dow Corning silicone products gives in 8 pages a brief but comprehensive summary of the properties and applications for the silicone products that are most widely used Products are indexed by type of application. With increasing effort devoted to product improvement and cost reduction such a reference guide to this remarkably stable group of engineering materials becomes increasingly important to design, production and maintenance engineers *No. 22*

Scratching or breaking of glass containers during filling operations or in shipping can be substantially reduced by treating them with Dow Corning EF-4010 Emulsion. Easily applied in the final steps of manufacturing glass containers, it requires no special equipment, curing temperatures are not critical It can also be applied to aged glass and cured by heating *No. 23*



Silicone Finish Improves the Appearance of Space Heater

Distinctive appearance and longer service life at no extra cost have been achieved by the Perfection Stove Company of Cleveland through the use of Glidden's Nubelon HR a modified silicone finish based on Dow Corning resins

According to Perfection, "Rich as aged leather in appearance, the finish we get by applying a light coat of mahogany over a primary coating of russet colored Nubelon HR is rugged tough, and very heat resistant It retains its color and luster for long periods of time We have been using it for over two years on all our oil heaters, with excellent results"

Nubelon HR is also more consistent and easier to apply than organic resin based enamels Supplied at a proper consistency for spraying, the labor and material cost of thinning are eliminated, and its slightly higher cost per gallon is offset by the effectiveness of thinner coatings Finished parts are baked 30 minutes in a traveling oven at a top temperature of 480 F. *No. 21*

Design Edition 5

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NEW AVIATION PRODUCTS



GOOD VISIBILITY allows pilot of boom fitted Aero Commander to fly low while spraying

Aero Commander Gets Spray Rig

Use of a new compact spray kit enables the twin-engine Aero Commander light transport to "double in brass" as an agricultural airplane and a passenger or executive ship—with the conversion taking only about one hour, according to the aircraft manufacturer. It is reported that the agricultural gear has no effect on its performance, other than to reduce cruising speed by about 20 mph.

Such a double-duty Aero Commander 520 has been supplied to the Kingdom of Yemen in Southeastern Arabia Thus is believed to be the first such use for the Aero Commander

Some of the features of the design for agricultural work, listed by Aero Design & Engineering Co, Bethany, Okla, are:

- **High-wing configuration** and level cabin floor (due to tricycle landing gear) make for easy installation of spray equipment.
- **Twin-engine dependability**, plus good over-the-nose visibility provide important factors when operating at low altitudes over congested and rough areas
- **Aircraft's long range** allows spray operations to be conducted in areas distant from base
- **Spray Equipment**—Venturi type spray system installed in the Yemen Aero Commander was designed, built and installed by Burnum Aviation Co., Inc, Arlington, Tex.

Two interconnected tanks, carrying 212 gal of chemical are attached to the cabin floor using the regular seat attachment fittings Filler pipe, to one of the tanks, is permanently installed in the top of the cabin, permitting rapid filling from outside

Spray booms consist of streamlined tubing extending from each side of the cabin and supported by V-shaped struts attached to the undersurface of the wings. Each boom carries three Burnum venturi outlets

The liquid chemical is fed to the venturis by gravity, a lever control near the pilot providing positive shutoff. The venturi outlets may be regulated to provide a coverage of from 1 pt to 8 gal. per acre If heavier coverage is desired, additional venturi outlets can be fitted



V-STRUTS carry spray booms under wings. Each boom carries three venturi oulets



SPRAT TANKS fit easily into cabin The tanks can be filled from outside

Improved Reducing Camera Produces Copies Faster

Latest models of the Peerless Neoflow reducing camera, redesigned for greater accuracy, easier and speedier operation and simpler maintenance, have been delivered to several aircraft companies, the manufacturer states

Sharper photocopies of engineering drawings, printed matter and the like are possible through use of a completely new optical system, a new conveyor arrangement for moving the material, an improved exposure unit and a new copying section, Peerless claims. Three standard models of the new camera are available

- **Model A** gives a single fixed reduction
- **Model B** gives two reductions, such as 2:1 and 4:1, or 3:1 and 6:1.
- **Model C** provides six reductions (2:1, 2½:1, 3:1, 4:1, 5:1 and 6:1)

All three models make either correct or reverse-reading copies

Peerless Photo Products, Inc, Shoreham, Long Island, N Y.

Missile-Plane Servo Valve Controls Hydraulic Flow

A new flow control valve, initially used on several guided missiles, now has been applied to inhabited aircraft for flight stabilization in applications where its ability to operate at 250F has been useful Principal application is in servo loops where high dynamic performance at high force levels is necessary

The new FC-2 servo valve can meet various customer requirements Its torque motor, of balanced coil resistance makeup, is supplied in ranges of 200-3,000 ohms d c resistance per coil. Signal levels as low as 6 ma differential current produce full valve flow when using the 3,000 ohms, the maker notes Supply pressures from 500-3,000 psi may be used

The FC-2 is a two-stage, four-way unit Pilot stage is a hydraulic amplifier of nozzle-type, driven by a torque motor using the polarized relay principle A miniature high-force positional loop between torque motor and main spool position encloses the nozzle stage, reportedly providing good value performance over a wide range of pressures and temperatures

Cadillac Gage Co, Detroit, Mich

Ground Air Conditioner For Cabins, Avionics

Portable ground air conditioning unit for cooling airplane interiors and avionic equipment utilizes a York six cylinder compressor and a rotary positive Rootes blower, has three 25 ft. ducts

Entire main airflow system is insu-



Developers of the Corporal Guided Missile

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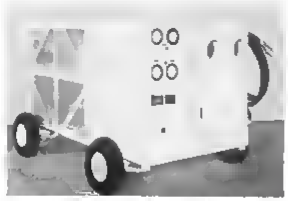
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PORTABLE COOLER is sound-insulated.

lated with fibrous glass to keep down noise levels, the maker notes. The unit pictured is rated for continuous duty, has a capacity of 80 lb./min. at 3 psig and 45F. It meets these conditions at ambient conditions to 120F (dry bulb) and 75F (wet bulb).

Electroflow, Inc., El Monte, Calif.



PORTABLE tester looks for leaks.

Pressure Unit Checks On Radar Fire-Control Systems

Semi-automatic test unit for ground checking radar gun fire-control systems for pressurization leaks is portable. Absolute pressure switch controls the low-pressure shutoff and is set for 60-in. mercury absolute, or is adjustable to other pressures. High pressure shutoff is manually controlled by a toggle switch. Pressure gage indicates to 100 in. mercury absolute.

Unit is covered with a transit case which, when removed, makes accessible 10 ft. of rubber hose and 15 ft. of electrical cable. Weight is 15 lb.

Lear-Romec Division, Lear, Inc., Elyria, Ohio

New Locknut Line Seals 'Wet Wing' Fuel Tanks

Increasing use of integral wing fuel tanks has made it necessary for fastener builders to design units that seal against liquid leakage. Such a fastener is the new Esna Type A2500 anchor nut, used in "wet wings" of the prototype Boeing 707 Stratoliner-Stratotanker.

These units are stated to provide a positive seal against leakage up to 50 psi. on either side of the sealing element regardless of vibration, strain or temperature. Type A-2500, approved by USAF and meeting AN N-5 specs., weighs approximately 1.20 lb. per 100. Full thread series is said to be available, including these sizes: 10-32, ¼-28, ⅜-24, ½-24 and ⅝-20, in gang channel strips and individual nut plates. No additional sealing compound is required, Esna says.

Elastic Stop Nut Corp. of America, Union, N. J.

ALSO ON THE MARKET

Hydra Springs providing up to 1,000% more force in a smaller space than mechanical springs, according to the manufacturer, are available in a new line, the result of shortening the chambers of the standard line. Springs use liquid compressibility.—Hydra Spring Division, Wales-Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y.

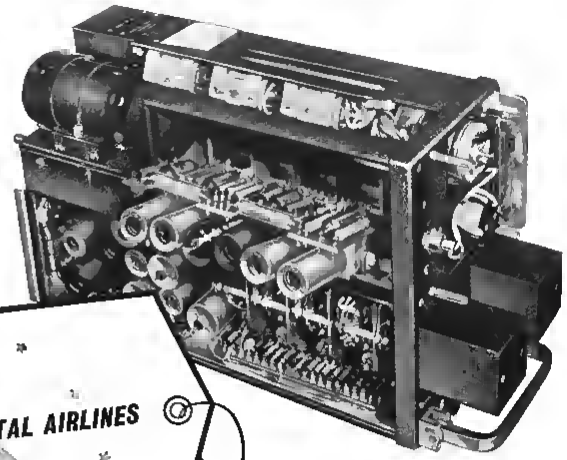
Laminated die stock made with Bakelite phenolic resins can be used economically for metal spinning chucks and other forms for shaping ductile non-ferrous metals, plastics, wood and other materials.—Bakelite Co., 260 Madison Ave., New York 16.

Explosion-proof fluorescent direct back lighting system for industrial and laboratory flowmeters is available as special equipment on Commercial Research Laboratories' single-stage and multiple stage equipment. For greater visibility, different colored scales can be supplied, with each color keyed to a specific metering fluid.—Commercial Research Laboratories, Detroit, Mich.

Motorized spindle for converting planers and old milling machines to high speed carbide milling is driven by a 20-hp., 1,200-rpm. glass-wound fan cooled motor and is directly connected to the rotor of the motor, eliminating gears and backlash, the maker says. Four table speeds, from 30 to 120 in./min., are available, a constant-feed device can be furnished.—Detroit Milling Cutter Co., 28625 Grand River, Farmington, Mich.

Synchronous motor-driven generator sets, delivering exactly 400 cycles regardless of load or input line voltage variations, are applicable for testing aircraft instruments, checking autopilot controls, radar, starters, guided missile control units. Units are two-bearing, common-shaft, synchronous-driven 40 pole alternator sets (1,200 rpm.) with magnetic amplifier controls. Voltage control system requires no adjustments, is maintenance-free and will last the life of the generator, the maker states.—Palmer Electric Manufacturing Co., 6629 Bear Ave., Bell, Calif.

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The type AD 7092 C receiver showing accessibility of components

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Cessna Report Demonstrates There's . . .

Still Room for the 'Little' Fellow

Cessna Aircraft Co.'s 1954 fiscal year report makes significant reading for two reasons. It is one of the early indications of results achieved by the aircraft industry last year. Also it is a reflection of the ability of a smaller factor in the industry to progress and generate earning power as a result of its own pioneering efforts.

For the fiscal year ended Sept. 30, 1954, Cessna reported sales of $45.1 million, the second highest in its history. All-time record was $70.3 million posted in the war year of 1943. Earnings after taxes in 1954, however, were the best in the company's record—$2,175,473, or $2.97 per share on the 731,109 shares outstanding. This contrasted with 1953 sales of $43.5 million and net earnings of $1,127,000 or $1.54 per share.

▶**Place in the Sun**—Cessna's 1954 sales of $45 million do not bulk very large when compared with United Aircraft's 1953 billings of almost $818 million or Lockheed's $820 million. But when reduced to a per share basis and related to its recent book and market valuations, Cessna's record does take on considerable stature.

This demonstrates that despite the development of massive corporate enterprises in the aircraft manufacturing industry, there remain challenging opportunities for smaller enterprises to grow and prosper.

▶**Behind the Rise**—Cessna's net for 1954 almost doubled, although sales increased only 35%. In large part, this reflects the elimination of excess profits taxes as of Jan. 1, 1954. However, full benefit of the removal of this tax will not be realized until fiscal 1955, since one-fourth of Cessna's fiscal 1954 income remained subject to the tax.

Another reason for the higher net. Initial high production costs on new models were absent last year, so higher profit margins were experienced. Pre-tax profit margins on sales in 1954 amounted to 11.3%, the highest since 1943, compare this to 8.3% for 1953. Net profit margins after taxes were 4.8% for 1954, the best since 1941 (when 13.2% was shown). This compares with 2.6% for 1953.

Dividends were paid for the fourteenth consecutive year in 1954. They amounted to 75 cents per share, for a total of $548,331. In 1953, dividends declared came to 50 cents per share, or a total of $365,554.

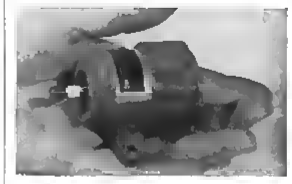
Military sales accounted for about $30.6 million, or 75% of the total 1954 volume. This is subject to the Renegotiation Act of 1951. The company has been cleared for renegotiation through 1952 and indicates that 1953 is now under examination.

▶**Increased Equity**—As a result of last year's operations, Cessna stockholders' equity increased to $10,181,000, or $13.92 per share, as of Sept. 30, 1954. This is the highest point reached by the company and shows a substantial gain from the $5.5 million ($7.78 per share) mark at the 1945 fiscal year end. An even more startling comparison is with the book value of $2.00 per share as of Sept. 30, 1941.

Despite continuing capital expenditures for new and augmented facilities, Cessna's financial position reflects considerable strength. Net working capital for the company aggregated more than $5.8 million Sept. 30, 1954, as compared with $4.1 million a year earlier.

The company has spent over $4.1 million in fixed asset expenditures since 1940. Most of these facilities are cov-

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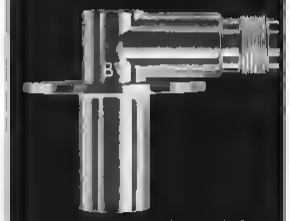
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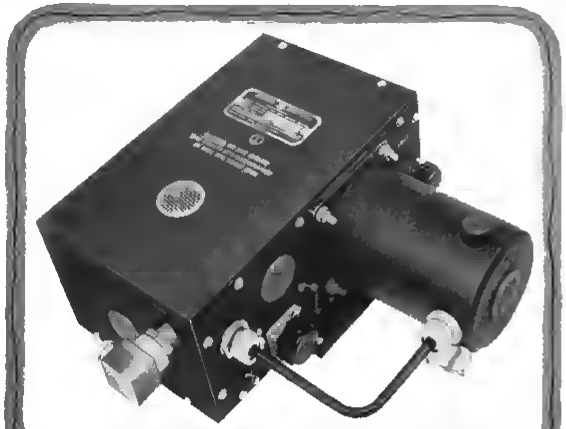
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ered by certificates of necessity on which an average of 73% was certified to be charged off for tax purposes over a five-year period The fast write-off has not only served to soften somewhat the heavy imposts during the excess profits tax periods but the resulting depreciation and amortization charges have served to generate cash for needed working capital

As of Sept 30, 1954, property, plant and equipment having an original cost of around $9 8 million was carried at a book value of only $3 2 million In the company's view, this is well below replacement value

▶**More Room for T-37**—Continued expansion of plant facilities in 1955 is reported as necessary due to "new products going into production."

A revealing comment in the report states " the production contract for the T-47 twin jet trainer makes it imperative that more floor space be provided" It is in this T 37 twin jet trainer development that much of Cessna's major military prospects are centered

The T 37 was given its initial flight tests in October It has been reported as performing well and the Air Force represented as "well pleased" with its performance A contract for about $5 million has been received—for production engineering, tooling and a "limited number of aircraft to be used for evaluation purposes" While not stated in the annual report, AVIATION WEEK has learned through other sources that the initial order is for 11 planes and is being placed in production on the Initial Low Rate manufacturing plan developed by the Air Force

Should the T 37 fulfill the military's expectations, it conceivably could become the next mass production trainer for the Air Force and the other services, with possible output running into thousands of units Once a jet trainer of this character is selected by the Air Force, it can become the source of continuing business for many years

▶**Irons in the Fire**—Cessna is also continuing production of B 47 empennage assemblies for the Boeing Wichita plant Deliveries of these assemblies are indicated as trending downward in 1955 but will carry well into 1956

A new subcontract project starting in 1955 is for the stabilizer for the B 52 jet bomber The first order for Cessna (obtained in competitive bidding) totaled about $5 million for tooling and a limited quantity of assemblies

Commercial sales on lightplanes of its own design and manufacture have also been gratifying to Cessna The company continues to explore the prospects of a four-engine pressurized aircraft for the business executive market

Cessna also has a strong string to its bow in its helicopter entry, the CH 1

—Selig Altschul



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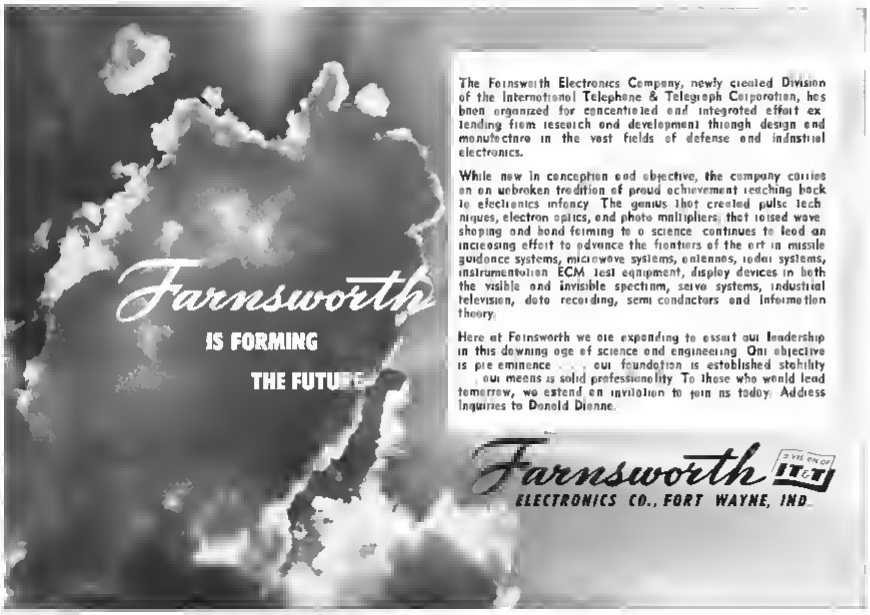
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T56 Boosts U.S. Turboprop Airliner Bid

- **Allison offers civil model of new engine to airlines.**
- **Three airframe builders show interest in turbine.**

By Irving Stone

The turboprop transport picture, painted from the beginning with muddy colors and broad strokes, is getting a new application of some clear tones and detail. The latest accents:

• **New transports** are being proposed by Convair, Douglas Aircraft Co. and Lockheed Aircraft Corp.

• **Model 501-D10 turboprop engine,** 3,750-eshp. commercial version of the Allison T56, is being offered to U. S. airlines and airframe builders by General Motors Corp.'s Allison Division. Also offered for commercial use is a three-blade Aeroproducts propeller.

Two big selling points behind the engine offer are put this way by Allison's assistant general manager, Harold H. Dice: (1) the 501's power-to-weight ratio of more than 2.3 to 1 is better than any known turboprop engine available today. (2) Fuel economy of the 501 is superior to any other turboprop engine in a similar state of readiness for commercial operation. Specific fuel consumption for the engine is reported as .54 lb./hp./hr.

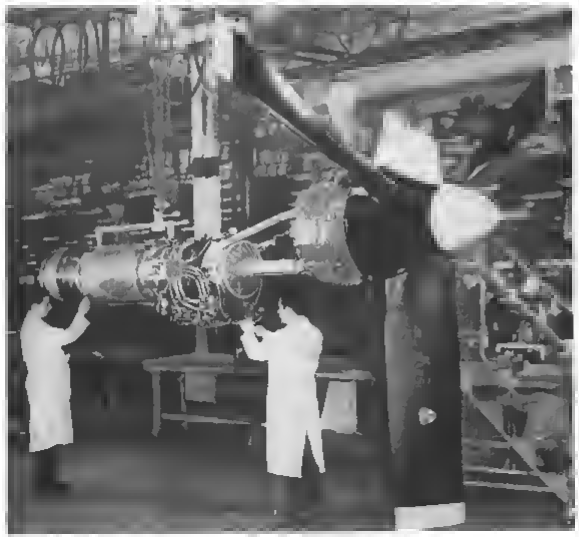
Obviously, Allison is playing heavily on the phrase "available today."

▶**British Competition**—Significantly, the Allison offer was timed simultaneously last week with turboprop transport proposals made by the three U. S. airframe builders to American Airlines in New York—and in the face of another foreign proposal. Bids:

• **Vickers** is offering American its Viscount transport, to be powered with a 2,000-eshp. version of the Rolls Royce Dart. This particular engine, which has not run yet, is tagged for later delivery.

• **Convair** is offering a twin-turboprop transport powered by Allison 501s. The plane essentially is the Model 340 converted to turboprop power. Only minor modifications of the airframe would be involved—principally beefing up of the tail and adding more tail area through increased height.

Convair would prefer to sell the 340 modification, AVIATION WEEK has learned. But to meet AA's leaning for a four-engine transport, the airframe builder also is proposing to use the 340 basic configuration powered by four of the 2,000-eshp. engines (Darts on Viscounts to go into service for Capital Airlines are 1,450-hp. units with 350 lb. additional thrust, reported to be 1,600-1,700-eshp. at about 320 mph.).



ALLISON 501-D10 TURBOPROP connects to prop gearing with 28-in. shaft.

Four T56s would be too much power for the Model 340 airframe without considerable redesign.

• **Douglas** is proposing a DC-6 with foreshortened fuselage, for reasons of economy. The full length is not needed for the 60-passenger plane AA would like to get as a replacement for the present Model 340s, for the short-to-medium runs.

Douglas is making three proposals based on the modified DC-6 scheme. One is for power to be supplied by four Allison T56 turboprops. Another contemplates the use of four Rolls-Royce RB-109s. The R-R turboprop is targeted to run this month; so far only components have been operated. The third proposal envisions the use of four Napier Elands. Report is that this is a 3,000-hp. turboprop engine, standing at less than 2 hp. per pound of weight, against more favorable T56 2.3 ratio.

• **Lockheed** is offering a brand new transport plane design, contemplating the use of four T56s. Hall Hibbard, Lockheed vice president-engineering, has mentioned an up-dated Viscount type for 60 passengers (AVIATION WEEK Nov. 8, 1954, p. 14).

▶**T56 Tests**—Allison shipped its first production T56 last week, 80 days ahead of schedule, for the Lockheed C-130. Type test may be approved by Apr. 1.

Five 150-hr. type tests have been run on the T56, each showing better results than the previous run, AVIATION WEEK has learned. The final test, completed last month, is supposed to have been the most stringent required to date. Heat reversal requirements—alternate running and shutdown—are said to have been increased by about 300%.

Also, the number of cycles of switching from positive to negative pitch was multiplied many times. Running time in the negative pitch condition also was increased.

Another feature was the operation of the engine for a longer time under ram conditions, the effect being to raise the horsepower above the guarantee for the engine.

Through component improvement within the same basic engine configuration, the powerplant is seen to have a

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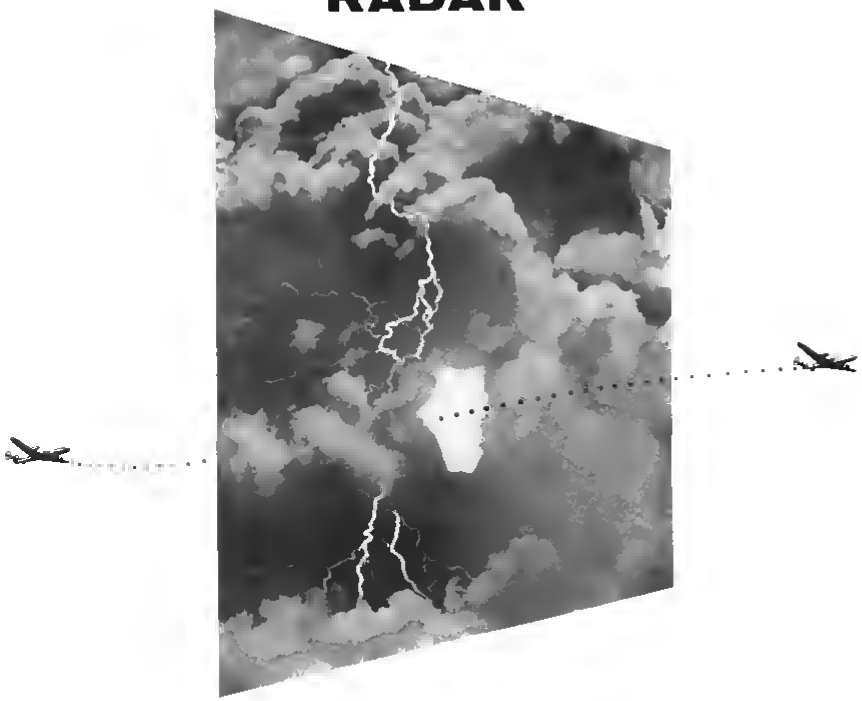
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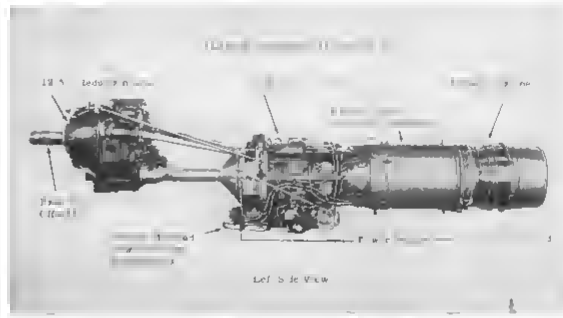
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COMPACT POWER SECTION pairs with offset reduction gear in 501 turboprop

growth potential up to about 4,500 eshp—a boost of about 750 hp over the present development.

▶ **450-Mph. Airlines**—Speaking before the New York Chapter of the Aviation Writers Assn. last week, Dice said:

- Speeds of four-engine transports can be advanced up to 450 mph. with the Model 501.
- Delivery of the 501 for certification of commercial aircraft can be made in July.
- Additional engine quantities will be available for airline use for service testing, pilot training and route checkout in November.
- Delivery of production engines for installation in certificated transports can begin in March 1957, with availability for scheduled airline use later that year or in early 1958.

By that time, Dice said, the Air Force will have accumulated two years of operating experience with the engine and it will have initial time before overhaul of 400 hr. for commercial operators. It is anticipated that the engine will be capable of going 1,000 hr. before overhaul in a period of five years or less after start of commercial service.

Dice believes the foreign advantage in turbine-powered aircraft performance will be brief. He said the U. S. aircraft industry is proving that by taking additional time for development "we are now able to present to the passenger flying public of the world, equipment which has greatly advanced performance and amply demonstrates the supremacy of the product made in the U. S. A."

Model 501 Details

Extension shaft, separating the reduction gear assembly from the power section of the Model 501, is about 28 in. long. This space permits adequate room for ducting air to the power section inlet and mounting of accessories on the drive pads located on the rear face of the reduction gear assembly.

Overhaul life of the reduction gear assembly is pictured at about three times that of the power section, hence the easy separation of the two units will ease overhaul problems.

Entire case of the power section, except for the inlet housing, is steel. This steel makeup, plus the annular-type combustion chamber is aimed at affording rigidity more than capable of handling flight loads, Allison says.

▶ **Speed Stepdown**—Power section shaft speed of 13,820 rpm. is reduced to the rated prop shaft speed of 1,106 rpm.—a 12.5 to 1 reduction. Speed stepdown occurs in two stages, a primary of 3.125 to 1 by spur gear set and a secondary of 4.0 to 1 by planetary gearing.

Reduction gear housing is cast magnesium and has a total assembly weight of about 450 lb.

A negative torque signal is built into the reduction gear assembly to give an indication for increase in prop pitch, as required, to limit torque feedback to a safe value. A prop shaft braking system reduces time required to bring the prop to rest after engine shutdown. This prevents windmilling when the plane is parked, stops engine rotation when the prop is full-feathered in flight.

▶ **14-Stage Compressor**—More than 30 lb. of air per second is handled by the 14-stage axial-flow compressor at a compression ratio exceeding 9 to 1 at rated power, standard sea level conditions. Compressor wheels, blades and stators are made of steel.

Combustor has six stainless steel liners in a one-piece outer shell. There are two igniters in diametrically opposed liners.

▶ **Four-Stage Turbine**—Turbine is a four-stage unit. First three stages of the four stainless steel wheels carry cast GMR-235 blades. Last stage has forged S-816 blades. Stator blades also are cast GMR-235.

Because of the high expansion ratio through the turbine, gases at the exhaust nozzle are at a relatively low temperature and velocity, so that about 10% of the total engine power is converted to jet thrust. Engine weight is 1,610 lb., length 145 in. and width 27 in. Frontal area is 6 sq. ft.

▶ **Three-Blade Prop**—Matched with the 501 but not limited to this specific engine is an Aeroproducts' A6341FN-215 three-blade prop, 13½ ft. in diameter.

Prop regulator is mounted on the rear of the hub, rotates with it and incorporates a self-contained hydraulic system with integral governing.

In addition to the negative torque signal system, there is a low-pitch stop and positive mechanical pitch lock. Low pitch stop gives a positive mechanical means against inadvertent prop reversal, while the pitch lock protects against any inadvertent decrease in blade angle from any position within the governing range.

Prop spinner incorporates deicing and anti-icing by means of rubber boots on the spinner shell.

Board Sets Pattern For East Coast Case

Civil Aeronautics Board has weeded out the applications filed in the New York-Florida service case, named the airlines which will participate and set the geographical scope of the proceeding.

The case stems originally from an application by Colonial Airlines. Subsequently, many carriers filed applications of various types for service along the eastern seaboard. When the case was set for hearing, several airlines asked for consolidation of their dockets with the original case, which then developed into an area service case.

▶ **Restricted to Domestic**—When the case came up for prehearing conference, such matters as Washington New York-Boston service and routes to international points were up for consolidation.

The Board now has decided to confine the case to domestic service and to a restricted area along the eastern seaboard. The scope of the case will cover service from Boston to Miami. Excluded are points south of Miami and north of Boston and west of Augusta, Ga., Columbia, S. C., Charlotte and Winston-Salem, N. C., Richmond, Va., and Washington, D. C.

CAB says "the scope of the proceeding would then consist of applications proposing additional longhaul trunkline service between Boston and New York, on the one hand, and Florida, on the other, substantially along Eastern's and

National's routes along the Atlantic Seaboard."

▶**Two Categories**—The Board finds that applications fall into two general categories. Trunkline service Boston/New York to Florida points along the Atlantic Seaboard and local service such as Washington New York-Boston.

Carriers whose applications are consolidated into the case under these categories are: Colonial Airlines, Braniff Airways, Capital Airlines, Delta Air Lines, Eastern Air Lines, National Airlines, North American Airlines, Northeast Airlines, Pan American World Airways, Peninsular Air Transport, Resort Airlines, Riddle Airlines, Trans World Airlines and United Air Lines.

At the same time, the Board denied applications filed by American and National asking investigation of through plane service between points north of New York and Florida through interchanges.

The Board also denied applications filed by Pan American, Braniff, Delta, Eastern, National and Trans-Caribbean for international services.

Also rejected were proposals to incorporate the Northeast-National merger investigation, and an application which would have brought a feeder line into the case.

WAL Buys DC-6Bs

Western Air Lines will have a total of 14 DC-6B aircraft in its fleet by next year as the result of a recent order placed with Douglas Aircraft Co. for an additional five.

Douglas reports the Western order brings the total DC-6Bs delivered or on order for commercial service to 213. A total of 554 of both the DC-6 and DC-7 series has been sold to airlines throughout the world in addition to a substantial number ordered for military use.

Nonsked Hit

- **Report of Senate group against 'unlimited entry.'**
- **But Small Business unit is expected to back them.**

The preponderance of evidence is against "unlimited entry" into the air transport network of large irregular airlines operating outside the regulatory jurisdiction of Civil Aeronautics Board, according to a staff study by the Senate Interstate and Foreign Commerce Committee.

The report, prepared under the direction of committee staff member Edward Sweeney, summarized in 85 pages the lengthy hearings held last year on civil aviation law and is the basis for the omnibus aviation bill introduced by Sen. John Bricker, ranking Republican and former chairman of the committee (AVIATION WEEK Jan. 17, p. 16).

▶**No Support'**—Bricker's bill would require CAB certification for all major air transport operations. The Board would have one year to decide whether to grant certificates to large irregular carriers. Only nonskeds operating planes under 12,500 lb. gross weight could be exempted from the certificate requirement and CAB regulation under the measure.

The basic issue is whether the policy of "regulated competition set forth in the 1938 Civil Aeronautics Act" should be abandoned, the study said, concluding: "There is no support, so far as the record is concerned, for the abandonment of this policy for one of unlimited entry into the air transport business."

"Moreover, it would be most difficult to argue that the policy of regulated competition should be applied to some carriers and not to others. A policy which contemplates direct competition between airlines operating under complete public utility obligations and airlines not subject to these obligations would be clearly unsound."

▶**Risk of Mistakes'**—The study concedes the disadvantages of regulation by a government agency and observes that "applicants must run the risk of mistakes in judgment" by CAB.

Its conclusion: "It is only through a policy of regulated competition that a truly nationwide air transport service can be provided. It is only through the proper enforcement of this policy that the people of the United States can have an air transport system at their beck and call as contrasted with a varying number of isolated airlines serving major points.

"That being the policy, it is essential that the CAB apply it with even handed justice. The provisions (of the Bricker bill requiring all airlines to obtain certificates) are designed to aid the Board in eliminating the present chaotic condition in which some of the exempt carriers are operating elaborate scheduled services in competition with the certificated carriers and with those nonscheduled carriers who are making an honest and successful effort to comply with the Board's regulations, the study said.

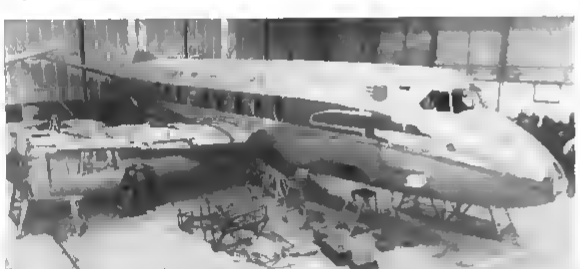
▶**Contrary Position**—A forthcoming report by the Senate Small Business Committee is expected to take a contrary position and maintain that the large irregular all-coach carriers, such as North American Airlines, are best qualified to handle the low-cost traffic between major points.

The Commerce Committee study presented CAB testimony refuting the argument that entry of new carriers and competition within the industry has been stifled under Board regulation since 1938. It showed 39 certificates granted for new types of operation, such as local service, helicopter and all-cargo, and detailed the authorized expansion in the field of trunk airlines.

▶**Lost Ground?**—The study pointed out but did not pass judgment on the contention of nonskeds that they have introduced new ideas and initiative into air transportation.

It observed: "That their presence, and tactics, have resulted in an intensification of competition in the industry is clear. But it is far from clear that the net results of the intensified competition and the competitive practices employed have advanced us further toward the ultimate objectives laid down in the 1938 CAA Act and which stand unquestioned today.

"There is persuasive evidence that ground has been lost."



Capital's First Viscount Nears Completion

Recent photo taken at Vickers-Armstrong's Weybridge plant, records progress of first of 60 turboprop-powered Viscount transports purchased by Capital Airlines. Capital will take delivery of the first one this April, will get its last Viscounts by February 1957.

Regulatory Snarl Stymies Airlines

By Frank Shea, Jr.

The air transport industry floundered in a state of suspended animation and uncertainty last week. Airline officials searched their memories in an effort to recall a previous time when the industry's regulatory picture was so completely muddled. Those polled by AVIATION WEEK voiced an almost unanimous opinion that "this is the worst it has ever been."

Even those known to be staunch Republicans confessed that things haven't been "quite this bad" since passage of the Civil Aeronautics Act in 1938. At press time, here is just how bad things were:

- **The industry** entered its third week of operation without a full-fledged regulatory body. Civil Aeronautics Board continued to limp along without a fifth member and with only an acting chairman. Decision on a successor for ex-member Oswald Ryan was more uncertain than ever. Criticism was intensifying over the manner in which the Ryan case was handled, not to mention comments on the general confusion that followed.

Critics who always contended that CAB was, for the most part, a vacillating group who avoided positive action, made the observation that the Board could now be that way officially. The industry's cry for need of a strong chairman to take the Board in hand was growing louder. Who would fill the bill as far as being strong and also acceptable to all interests, especially local service airlines remained a moot question.

- **Airline route** cases continued to pile up, with total time on delays for all of them running somewhere between a quarter and a half century—some pending action before the Board, others awaiting Presidential decree.

Most serious situation of all was posed by continued delay of international cases pending at the White House—Balboa, trans-Atlantic cargo, States Alaska and trans-Pacific certificate renewal. Decisions in these cases will have a significant effect on the international route structure—also on overall national air policy.

Lack of decision is causing widespread economic uncertainty. Despite the seriousness of the situation, the President and his staff continued to hold back on these all-important decisions.

- **No concrete sign** was evident, of any action concerning the fate of the nonscheduled airlines, particularly North American Airlines domestically and Seaboard & Western Airlines on the Atlantic. A showdown on this issue should come this year, however, with congressional leaders pressing for action that will put those nonskeds out of business who are not certificated by year's end.



WILLIS: An aviation bottleneck?

- **Airline profit margins** continue to narrow, despite tremendous traffic gains. Almost all company year-end figures indicate this, as well as industry totals released by Air Transport Assn. Corrective action, possibly in the form of slight fare increases, is up to CAB. Chances for such corrective action are deemed pretty slim for some time to come in view of present conditions.

Even when the CAB vacancy is filled and a new chairman appointed, confirmation is expected to take months. All this time, profit margins will continue to narrow, and with Board business piling up fast it is considered certain that this problem will be low down on the priority list when the Board is ready to resume business with five members and a chairman.

- **Appointment of a successor** for resigning Undersecretary of Commerce for Transportation Robert Murray still was not in sight last week, adding one more important ingredient to the general confusion of the nation's commercial air picture.

Industry officials are frankly resentful, feeling that one of the country's fastest growing industries hardly warrants this type of treatment in government. The president's budget message last week (p. 13) stressed the promotion of commercial aviation. Industry's immediate reaction was: How do you stress promotion of commercial aviation on the one hand, at the same time permitting the existing regulatory snarl to continue.

▶**Dent in Subsidies**—Also, the President boasts that, under CAB and in accordance with Air Coordinating Committee recommendations, subsidy cuts have been attained. Industry officials contend that a forceful Board, applying the ACC recommendations aimed at elimination of uneconomic route duplication and merger of weak operations with stronger ones could put a really significant dent in the subsidy tab rather than a token one.

General industry comment on the budget message was that it is one thing to talk in positive terms of promoting commercial aviation—but it still is another thing to take action on the many negative elements presently inherent.

▶**Chief Bottleneck**—Scheduled airline representatives in Washington are inclined to locate the chief bottleneck in this regard right in the White House in the office of Charles Fountain Willis, staff assistant to President Eisenhower and former operator of a nonscheduled airfreight service.

Willis has become a recent target of Washington columnists who have hinted his activities in handling aviation and television policy decisions in the White House may be the subject of a congressional investigation.

There are also indications on Capitol Hill that several newly elected Democratic senators also may take the investigation trail over White House handling of aviation policy and the role of Willis as a target. Willis' official role on the White House staff is that of coordinator between the President, various government agencies and private industry. His aviation activities are only one facet of his official duties.

However, airline representatives who have attempted to side-step what they now regard as the "Willis bottleneck," report they have been told by Administration officials, "See Willis: he calls the shots on air matters."

NWA Reports Higher Net Profits, Income

Northwest Orient Airlines' net operating income increased 44% and its profits were up 12% in 1954 over 1953, reports NWA president Donald Nyrop.

Although the annual audit has not been completed, company figures show:

- **Net operating income** of $4,529,000 for 1954, compared with $3,143,000 for 1953.
- **Net profits** totaling $2,297,000, compared with $1,945,000.

▶**Cost Control**—The company credits the improved financial position to "a rigid cost control program applying to all operations and to personnel, which began early in 1954 and was furthered by Nyrop when he became president in August."

A 9.7% increase in "production" was coupled with a decline in expenses. The



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company says Northwest "produced 194 million available ton-miles in 1954, compared to 176 7 million in 1953 At the same time, expenses were held to $58,671,000 in 1954, compared with $58,906,000 in 1953"

NWA employment dropped from a high point of 5,884 in mid-1953 to 4,900 at the end of 1954

►**Subsidy Drops**—This and other savings, the airline reports, reduced Northwest's cost per available ton-mile from 33 33 cents in 1953 to 30 13 cents in 1954

Nyrop says that as of Dec 31, the company had approximately $8,633,000 cash on hand "with no borrowings from banks or other financial institutions"

Reporting that its subsidy for all international operations dropped from $381,000 in December 1953 to $92,434 in December 1954, the company says it "is moving faster than any other U S international carrier to do away with dependence on government subsidy"

Viscount Crash Report Blames Slow Takeoff

(McGraw-Hill World News)

Melbourne—Takeoff at a speed too slow to maintain control caused the crash of a Trans-Australia Airlines' turboprop Vickers Viscount last October, the Civil Aviation Department rules in its official report

A contributing factor, the report says, was the crew's limited experience with the new transport

The wreckage was examined thoroughly and some components tested for metal fatigue However, none was disclosed

The Viscount crashed on a training flight Oct 31 at Mangalore, about 60 mi from Melbourne The crew was testing the transport's performance on three of its four engines Shortly after takeoff, the plane made a right turn, its wing dipped and struck the ground The plane cartwheeled and burned Three TAA pilots were killed

New Peruvian Airline Gets B-17 Transports

A new Peruvian airline, Rutas Aereas Peruanas S A (Rapsa), has received a modified Boeing B-17 that carries 18 passengers, a crew of four and is capable of handling eight tons of cargo The airline reportedly has contracted for four B 17s and two Lockheed 14s, which are being overhauled in the United States

Rapsa was capitalized for $750,000 to operate domestic and international routes President is Enrique Marsano, Peruvian inventor and financier

CAB ORDERS

GRANTED

Caribou Air Charter a foreign air carrier permit for irregular service between Canada and the United States, with certain restrictions, for three years

Seaboard & Western Airlines an exemption to fly a passenger charter from London to Jacksonville, Fla, and return to Paris

City of Columbus, Ohio, and the Columbus Chamber of Commerce leave to intervene in the case involving the amendment of Delta-C&S Air Lines' certificate to add Ft Wayne, Ind, to Route 54

ORDERED

Capital Airlines' exemption, permitting free transportation for certain Bell Telephone employes, extended for six months from Jan 20, 1955

Investigation and suspension of certain Johnson Flying Service charter rates

Braniff Airways' temporary mail pay for Latin American operations fixed at the rate proposed by CAB in its show cause order of Dec 22, 1954

Pan American-Grace Airways' temporary mail rate fixed at the rate proposed by CAB in its show cause order of Dec 22, 1954

DENIED.

City of Jackson, Mich, and the Greater Jackson Assn leave to intervene in American Airlines' Chicago-Detroit Route 7 local service case

SHORTLINES

►**British Overseas Airways Corp.** will have specific names for all its worldwide services BOAC is adopting the "name service" policy as a sales aid

►**Bonanza Air Lines** showed a 15% gain in revenue passengers, a 10% gain in load factor and a 16% increase in airfreight ton-miles during 1954

►**Allegheny Airlines** recorded an all-time high in passenger-miles during 1954, flying a total of 42 6 million The local service carrier boarded 277,000 passengers in 1954

►**Central Airlines** carried 6,111 passengers in December 1954, a gain of 125% over December 1953 Each passenger traveled an average of 168 mi last month, compared with 155 mi in December 1953

►**North American Airlines** reports 3,244,000 passenger miles flown Jan 2, an all-time high for the nonscheduled carrier

►**Swissair** marked the end of 1954 by making its 2,000th crossing of the Atlantic Crossings total about 8 2 million miles



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News Sidelights

Civil Aeronautics Administration certification of all USAF air traffic controllers will be speeded by an agreement whereby CAA delegates authority for one year to each group commander of the Air Force Airways and Air Communications Services to conduct official written examinations similar to the standard Civil Service test with provisions for jet operations included. Practical part of the exam can be given by military control tower personnel designated by CAA.

Demonstration tour of Southern U. S. and Central South America will be made by a Swedish Saab 91C Safir four-seater beginning Feb. 1. Fourteen countries are on the Safir's itinerary. Saab thus far has sold more than 150 Safirs and they are flying in 15 countries.

First class of 15 Naval and Marine Corps officers has been graduated from the University of Southern California Naval Aviation Safety Course which is similar to the USC safety course for USAF officers.

CAA attorneys recently solved the puzzler of whether a person who holds no pilot's certificate can taxi an uncertificated airplane around a large field surrounded by trees carrying the public at $1 a head. They concluded that the operation was "completely intrastate, exclusively on the ground, in an area where no other air commerce can be endangered or affected,' and concluded that CAA could forget about the matter.

Wing and empennage de-icing boots and propeller anti-icing shoes are now available to Aero Commander twin-engine business-plane owners, covering both Models 520 and 560. Goodrich kits have been approved by CAA for the planes. Entire de-icer boot installation adds about 95 lb. to Aero Commander's weight.



NEW PROP AUTO FEATHERING SYSTEM has a simple mechanical linkage for transmitting torque signals, eliminating the need for engine torque noses and associated hydraulic and mechanical instruments and accessories. It has been demonstrated at Santa Monica (Calif.) Airport on prototype Wright-powered Learstar business transport. System was designed and built by Lear Aircraft Engineering Division, Santa Monica. During a takeoff, a CAA flight test pilot shut off fuel flow to the Learstar's port engine as the plane reached 105 mph. While the left prop feathered automatically, the plane was held on the ground until 120 mph. was reached, then takeoff and climbout were made on one engine at 440 fpm. for the first segment and 640 fpm. for the second stage. Photo shows the Learstar's one-engine takeoff.

AVIATION CALENDAR

Jan. 24-28—Institute of the Aeronautical Sciences, 23rd annual meeting, Honors Night Dinner, Hotel Astor, New York.

Jan. 27-28—Southern California Meter Assn., fourth annual Instrument Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.

Jan. 31-Feb. 3—Airlines Electronic Engineering Committee, winter meeting, Hotel Warwick, New York.

Jan. 31-Feb. 4—American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.

Jan. 31-Feb. 4—American Society for Testing Materials, annual Committee Week, Netherland Plaza Hotel, Cincinnati.

Feb. 8-10—National Association of State Aviation Officials winter meeting of board of directors, Lafayette Hotel, Washington, D. C.

Feb. 8-10—Society of the Plastics Industry, 10th Reinforced Plastics Division Conference, Hotel Statler, Los Angeles.

Feb. 10-11—Society of American Military Engineers, military-industrial conference on manpower, Conrad Hilton, Chicago.

Feb. 11—Air Transport Command 10th reunion dinner of World War II officers, Waldorf-Astoria Hotel, New York.

Feb. 20-22—Fourth annual Texas Agricultural Aviation Conference, A&M College of Texas, College Station, Tex.

Feb. 20-22—Institute of Surplus Dealers, trade show and convention, 212th AA Armory, New York.

Feb. 21-22—National Model Plane Show, Higbee Co. auditorium, Cleveland.

Feb. 23-25—Fourth annual Ohio-Indiana Agricultural Aviation Conference, Purdue University, Lafayette, Ind.

Feb. 26-27—Associated Glider Clubs of Southern California ninth annual Pacific Coast Mid-Winter Soaring Championships, Torrey Pines Glider Port, San Diego.

Mar. 1—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.

Mar. 14-16—Society of Automotive Engineers production meeting and forum, Netherland Plaza, Cincinnati.

Mar. 14-18—American Society of Tool Engineers, first Western Industrial Exposition, Shrine Auditorium and Convention Hall, Los Angeles.

Mar. 20-23—Aero Medical Assn., 26th annual meeting, Hotel Statler, Washington, D. C.

Mar. 21-24—Institute of Radio Engineers, national conference, Waldorf-Astoria Hotel and the Kingsbridge Armory, New York.

Mar. 28-Apr. 1—American Society for Metals ninth Western Metal Exposition and Congress, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, Britain's National Physical Laboratory, Teddington, England.

Apr. 5-7—Radio Technical Commission for Aeronautics, spring assembly and joint meeting with the Institute of Radio Engineers, Los Angeles.

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Grandpa's Words Are Still True

These words formed the first paragraph in the editorial section of the first issue of *Aviation and Aeronautical Engineering*, August 1, 1916. They stand for the idea that grew through two generations of Aviation magazines to become *Aviation Week*, and they're still true.

"The future of the aeroplane will depend largely on the use that is made of the technical information that is being gathered in all parts of the world. As this data is made available to the constructor and engine maker, they will find its utilization more and more imperative for the scientific improvement in design and construction from the standpoint of safety and efficiency."

Aviation Week developed from *Aviation and Aeronautical Engineering* just as today's supersonic jets evolved from 1916's flimsy biplanes. In 1922, *Aviation and Aeronautical Engineering* (then called *Aviation & Aircraft Journal*) became *Aviation*, and evolved into *Aviation Week* in 1947. Its form and style were tailored to match the jet age, and from its very beginning *Aviation Week* established itself as the Aviation Industry's one preferred magazine.

Still growing with aviation progress, Aviation Week is constantly gaining more of the same acceptance and prestige that have made it the industry's unchallenged favorite. Its editorial pages TELL the industry . . . Its advertising pages SELL the industry.

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- First in paid circulation
- First in advertising volume
- First in reader preference
- First in advertising results among publications serving the aviation industry

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A MESSAGE FROM THE PUBLISHER

Robert B. Hotz will be the new editor of AVIATION WEEK, succeeding Robert H. Wood whose resignation will become effective Feb. 1, 1955. Mr. Wood leaves with the good will and best wishes of the McGraw-Hill management.

Bob Hotz, who has been executive editor of AVIATION WEEK with headquarters in Washington, D. C., needs no introduction to aviation people. His accurate and incisive reporting of industry and military affairs through the years has achieved an international reputation for him. Under his editorial direction, AVIATION WEEK is certain to accelerate and expand the broad editorial program now in force that has produced one of the most spectacular publishing successes of today.

Bob's experience with AVIATION WEEK dates from its founding in 1947 when he became news editor. Since 1952 he has been executive editor. He came to the McGraw-Hill Publishing Company directly from the Air Force, where he served under General Claire Lee Chennault in China, both as a staff officer and in combat operations. During his military service, Bob also served as Air Transport Command liaison officer with the Intercontinental Division of Trans World Airlines during its pioneer operations of four-engine transports over global routes. He also has had practical experience in the aircraft industry with the Pratt & Whitney Aircraft Division of United Aircraft Corp.

New Advertising Peak

In line with this message, I think our AVIATION WEEK readers also would like to know something about the tremendous success our magazine enjoyed in 1954 and its outlook for 1955. The past 12 months have been a record year for AVIATION WEEK, culminating in an all-time advertising peak of 3,519 pages. This substantial figure places us again in the select group of the nation's 25 largest magazines, a distinction no other aviation publication has ever enjoyed. Bright as the performance was during 1954, the outlook for 1955 exceeds anything in our history. January 1955 showed an advertising lineage gain of 70 pages over the same month of 1954. This gain was larger than that of all other U. S. aviation publications combined. Initial estimate for February shows a continuance of this extraordinary trend.

This tremendous acceptance of AVIATION WEEK by the aircraft industry is a natural result of its accurate reporting and its firm, independent editorial policy. These policies will be pursued more vigorously than ever under our new editor.

Editorially, 1954 was a remarkably productive year. Among the exclusive staff-written editorial features AVIATION WEEK presented its readers were: The special Air Materiel Command issue that documented the USAF managerial revolution and its impact on industry; international coverage of the intense competition for the airline jet transport market, reports on air operations in the Indo-China war and the Far East frontier, surveys on the growing force of avionics in the aircraft industry, new technical developments in airframes, propulsion and equipment, a series of special interviews with top military officials on new aircraft procurement policies, and "on-the-spot" reporting on legislation and federal regulations from Washington, D. C.

This editorial formula attracted an ever-increasing list of readers, with a net paid Audit Bureau of Circulation figure for the Dec. 27, 1954, issue of 50,234 subscribers and a current print order of 54,127. AVIATION WEEK's subscription price is $6 per year, the highest in the field. These figures represent a substantial and healthy growth pattern for the future of AVIATION WEEK. During 1954, AVIATION WEEK embarked on its first major readership research project by offering its availability to the Advertising Research Foundation for their Study Number Six—The Continuing Study of Business Papers. The results of this study once again emphasized the marked appeal of our editorial content. This study tells one of the most impressive stories ever recorded about readership in the aviation industry.

Editorial Expansion

AVIATION WEEK intends to fortify its position as the best-read magazine in aviation by further expanding and improving its editorial staff to meet the continued growth and changing character of the aviation industry it serves. There will be important staff announcements in the next few weeks covering additions to the Los Angeles, Washington and New York editorial offices. In addition, AVIATION WEEK will shortly shift its printing to the most modern high-speed rotary presses. This new production equipment can print 64 pages in two colors at the same time, deliver 18,000 signatures in one hour and guarantees a superior and faster service to AVIATION WEEK subscribers.

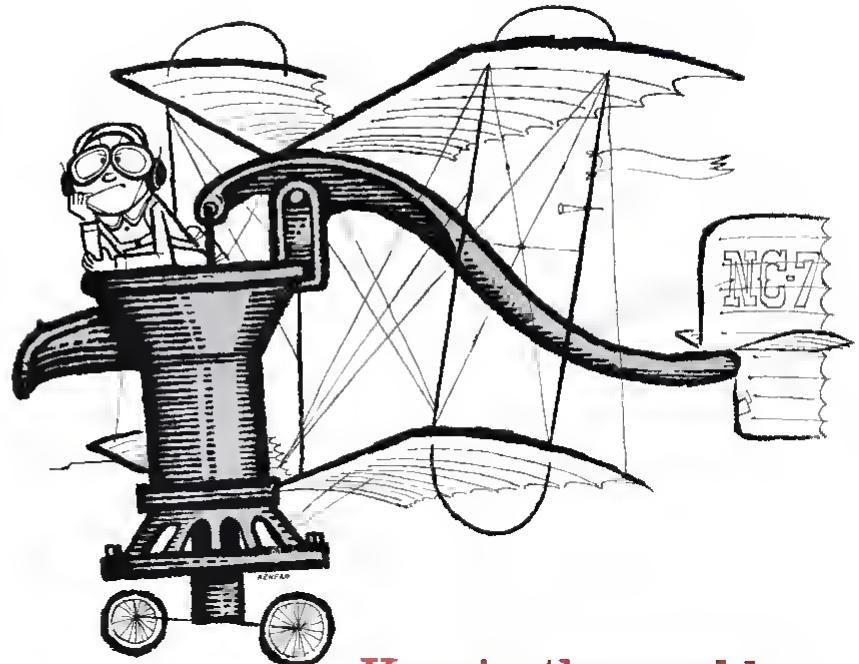
The fiscal 1956 budget message of President Eisenhower transmitted to Congress last week shows clearly that AVIATION WEEK will continue to serve a stable and healthy aircraft industry—the nation's first line of defense in the age of atomic airpower. For the third straight year, the aircraft industry will report sales in excess of $8 billion, while airline revenues are growing steadily.

Stable Industry Prospects

Total of $23 billion in unexpended military funds earmarked for aircraft procurement, plus the $7.5 billion requested for fiscal 1956, insure the continuance of the aircraft manufacturing industry at about the $8-billion level for the next three years. Airline prospects, particularly if aided by enlightened federal regulatory policies, also appear bright.

This does not mean that the industry will not face serious problems in the years ahead. Technical competition is fiercer. Federal regulations and financial policies may seriously retard potential growth. During this period, the industry will need both a vigorous voice and a strong public conscience. AVIATION WEEK will continue to do both these jobs without fear or favor and with accuracy as its guiding principle.

—Robert W. Martin, Jr.



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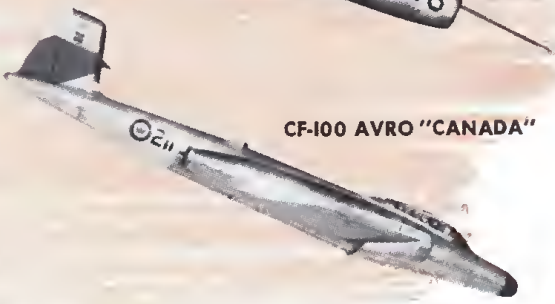
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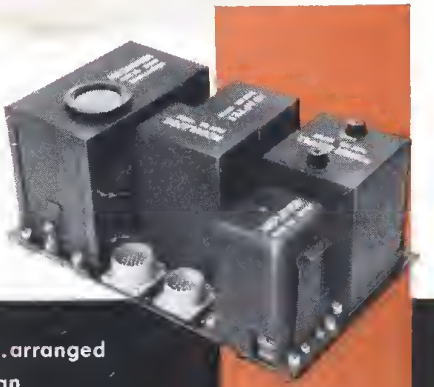


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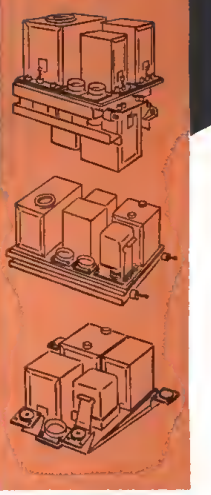


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